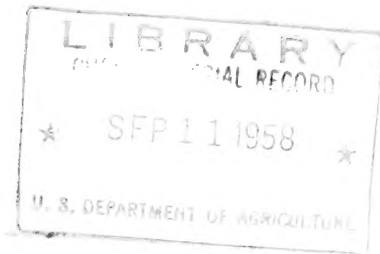


Historic, archived document

Do not assume content reflects current
scientific knowledge, policies, or practices.

Rec'd
A3/13
R3/Ae



FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL

EXPERIMENT STATIONS

Projects in

PLANT PATHOLOGY

Part 17, Section b

Diseases of Field Crops

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled May 1958 by

The State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued July 1958

FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL EXPERIMENT STATIONS

Projects in

PLANT PATHOLOGY

Section b: Diseases of Field Crops

Contents

| | Page |
|---|------------|
| I. CEREAL CROPS | 1 |
| A. General | 1 |
| B. Barley | 2 |
| C. Corn | 7 |
| D. Oats | 11 |
| E. Rice | 15 |
| F. Sorghums | 15 |
| G. Wheat | 16 |
| II. FIBER AND OIL CROPS | 21 |
| A. Cotton | 21 |
| B. Flax | 28 |
| C. Peanuts | 29 |
| D. Soybeans | 30 |
| E. Other Crops | 33 |
| III. SUGAR CROPS | 33 |
| A. Beets | 33 |
| B. Cane | 34 |
| IV. TOBACCO | 36 |
| A. Viruses | 36 |
| B. Others | 36 |
| V. FORAGE, TURF, AND COVER CROPS | 38 |
| A. General | 38 |
| B. Grasses | 42 |
| C. Legumes | 46 |
| D. Alfalfa | 49 |
| E. Clovers | 53 |
| F. Lespedeza | 55 |
| G. Minor Legumes | 55 |
| VI. REGIONAL PROJECTS | 56 |
| VII. LIST OF SUBJECT-MATTER AREA COMPILATIONS | Attachment |

INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

CEREAL CROPS

General

- Minn. Epidemiology of Leaf Spots and Other Foliage Disease of Crop Plants.--II. Corn and Small Grain Diseases. To determine number, prevalence, and distribution of physiologic races of important pathogens that cause foliage diseases of corn and small grains and also the relative importance of such diseases in breeding disease-resistant varieties.
Pl. Path., Bot. FH-2219-2
- N. Y.
(Cornell) Diseases of Small Grains; Virus Diseases of Oats and Other Cereals. Identify and differentiate the kinds and strains of viruses attacking oats, study their importance, aid in development of improved techniques for these studies.
Pl. Path. 132-8, Coop. ARS
- Tenn. Root Diseases of Small Cereals, and the Nematode Relationship. To (1) continue basic investigations of root disease-inciting organisms, as to occurrence, relative importance, pathogenicity, taxonomy, and influence of environmental factors; (2) seek control of certain cereal root diseases by means of breeding, cropping practices, and fungicides; and (3) study root disease-nematode relationship in cereals.
Pl. Path. 137
- Va. Diseases of Barley, Oats, and Wheat and Breeding of Disease-Resistant Varieties. To (1) develop varieties of barley, oats, and wheat resistant to rusts, smuts, powdery mildew, and other damaging diseases; (2) culture organisms causing the diseases, and learn effects of environment on them; (3) study histologically and physiologically the processes of diseases caused by these organisms; (4) study genetics of causal organisms and related cytological phenomena; (5) develop methods of control of small grain diseases and promote use of known methods; and (6) study inheritance of resistance to small grain diseases.
Pl. Path., Physiol., Agron. 86057, Coop. ARS
- Wash. Investigations on Root Rots and Foot Rots of Cereals and Grasses in Eastern Washington. To (1) learn distribution, prevalence and economic importance of root and foot rots of cereals and grasses in Eastern Washington; (2) learn cause(s) of these diseases; and (3) develop control measures.
Pl. Path. 864
- Wash. Virus Diseases of the Cereals and Grasses. Learn virus diseases of cereals and grasses in state, their distribution, prevalence and severity, cereals affected, forage and weed grasses harboring them, and pertinent factors in spread of disease. Develop resistant varieties or other control.
Pl. Path. 1280

Wash.

The Influence of Specific Organic Compounds in the Soil Solution (Other than Antibiotics) on the Development of the Root and Crown Rots of Cereals and Grasses. Learn influence of specific organic compounds on development of root and crown rots of cereals and grasses (if they increase or decrease disease level) and if they influence formation of resting spores or other structures of survival formed by pathogens within diseased root and crown tissues.

Pl. Path. 1286

Wyo.

Incidence and Control of Diseases of Small Grains. (1) Learn method of application, effectiveness and mode of action of chemicals for control of stem rust. (2) Test susceptibility of grasses and wheat varieties to wheat streak mosaic. (3) Study identification and possible biological control of pathogenic victoria blight on oats. (4) Continue surveys directed toward apprehension of new diseases.

Agron. 704

Barley

Ind.

Breeding of Barley for Indiana and Investigations of Related Genetic, Pathological, and Agronomic Characters.

(1) Develop and evaluate new varieties of winter barley superior in yielding capacity, winter-hardiness, standing ability, and quality and resistance to diseases, and hessian fly. (2) Study nature of inheritance of morphological and physiological characters and resistance to diseases. (3) Conduct pathological studies needed to evaluate disease hazards and efficient breeding of disease-resistant varieties. (4) Evaluate certain physiological and morphological characters as related to breeding program and agricultural practices.

Agron., Bot., Pl. Path. 968, Coop. ARS

Iowa

The Development of Superior, Disease Resistant Varieties of Barley. To (1) direct hybridization and selection work toward developing varieties of barley, wheat, and flax best suited to maximum production in certain areas of the state; (2) test and evaluate new hybrids in early generations at northern and western outlying stations, selecting for high yield, stiffness of straw, mid-season maturity, satisfactory grain quality and resistance to diseases most likely to limit yields; (3) to obtain additional and more critical information on value of bulk and pedigree methods of breeding barley, as work to date gives some conflicting information; (4) investigate effects of newer types of drying equipment on malting quality of dried barley; (5) test new accessions of barley in the field to locate disease resistant germ plasm; (6) cooperate with Farm Crops in observing new germ plasm derived from breeding program for susceptibility and resistance to disease; (7) determine importance of diseases in wheat production in Iowa, especially spread of wheat mosaic; (8) develop new and more simple technics for producing disease epiphytotics necessary for locating disease-resistant germ plasm in barley, especially with respect to scab.

Farm Crops, Bot., Pl. Path., Agron. 1177

Md.

Breeding for Mildew Resistance in Winter Barley and Wheat. To (1) contribute to the study of genetics of resistance to powdery mildew, Erysiphe graminis hordei, (2) devise or improve methods for creating artificial epidemics of the disease useful in evaluating breeding material and in estimating damage from the disease, and (3) breed superior varieties of winter barley and winter wheat having a high degree of mildew resistance.

Agron. B-69 (NE-23) Coop. ARS

Minn.

Varietal Improvement in Barley. To obtain improved varieties of barley for Minnesota.

Pl. Genet., Agron. 1304

Miss.

Barley Breeding. To (1) develop new varieties of barley better in all respects than currently available strains, (2) determine where in this state barley can best be grown, and (3) conduct fundamental studies when they are needed.

Agron.-Crops HC-4

- Mo. Annual Testing and Breeding of Winter Barley Varieties and Strains for Yield, Winter Hardiness, and Disease Resistance, with Special Emphasis on the Smut Diseases. To (1) breed better varieties adapted to Missouri conditions and to test such for hardiness, (2) discover varieties and selections resistant to disease and insects and superior in agronomic qualities and to evaluate such for use as feed, and (3) analyze the genetics governing the inheritance of characters associated with productivity, winter hardiness, disease and insect resistance.
Field Crops FC-90, Coop. USDA
- Mont. The Improvement of Barley in Montana Through the Development of Superior Varieties and Cultural Practices. To (1) determine adaptation of new and introduced barley varieties and selections, (2) develop, by hybridization and selection, varieties superior to those now grown in Montana, (3) develop and improve cultural methods, (4) develop new uses and expand former uses for barley through plant breeding, (5) search for basic information for most feasible and economical means of accomplishing these objectives.
Agron. 953, Coop. ARS
- N. J. The Breeding of Varieties of Winter Barley Resistant to Loose Smut. To attempt to develop winter barley varieties that are resistant to the races of smut present in the region.
Field Crops 261 (NC-23)
- N. C. The development of Winter Barley Varieties with High Yields of Good Quality Grain and with Resistance to Disease, to Winter Injury and to Lodging. Breeding--To develop through breeding varieties or strains of barley combining as many as possible of these characteristics: 1. resistance to powdery mildew, leaf rust, smut, mosaic, stripe, spot blotch and scald; 2. varieties with stiff straw and with sufficient winterhardiness to be grown throughout the state; and 3. good yields of grain with heavy test weight and high feed value. Testing--To evaluate promising new strains from above breeding program or which may be available from the Crops Research Division, or other state experiment stations. Germ Plasm Survey-- To make survey of germ plasm to find types which may contribute to above breeding program. Genetic Studies--To conduct investigations in genetic variability of barley and develop techniques for more effective selection in the improvement of the crop.
Field Crops 57, Coop. ARS

N. Dak.

Breeding and Genetics of Spring Barley.--A. Breeding Spring Barley for Disease Resistance, Desirable Agronomic Characters, Malting and Feeding Quality. To produce varieties which are: (1) resistant to spot blotch, stem rust, and loose smut; (2) satisfactory in malting and feeding, and (3) suitable agronomically in yield, straw stiffness and head strength and ease of handling.

Agron., Pl. Path., Cereal Tech. 6-8, Coop. ARS

N. Dak.

Resistance to Barley Leaf Diseases. (1) Locate barley species, or species closely related to barley, which are resistant to one or more barley leaf diseases. (2) Cross these species with varieties of common barley.

Agron. 6-16, Coop. ARS

Okla.

Barley Diseases and their Control. To (1) develop test for spot blotch resistance in barley, and test varieties from world collection for sources of resistance; (2) determine race or faces of powdery mildew in Oklahoma and test for resistance to these races; (3) grow regional mildew nursery in cooperation with USDA; (4) closely observe breeding material at Stillwater and commercial plantings for appearance of a new disease or outbreaks of diseases whose causal agents are known; and (5) establish root disease garden where resistance to root diseases can be evaluated.

Bot., Pl. Path., Agron. 599, Coop. ARS

Pa.

Scald Resistance in Winter Barley. (1) Search for sources of scald resistance in barley so that parental material may be available for breeding scald resistant winter barley, (2) learn if scald problem is due to one or more pathogenic races of Rhynchosporium secalis, (3) investigate methods of inoculation to find best method for large scale outdoor testing, (4) learn if organism is seed borne.

Bot., Pl. Path. 1250

Tex. Barley Improvement. To (1) develop or discover new varieties of barley superior to present varieties, and adapted to production of grain, forage, or a combination of the two, (2) incorporate into adapted varieties resistance to greenbugs from Omugi and other oriental varieties, and to continue search for resistance to greenbugs, etc., (3) attempt to incorporate resistance to diseases attacking barley, such as mildew, smuts, leaf blotches, and false stripe, (4) develop varieties resistant to leaf and stem rust for central and southern parts of state where overwintering of the diseases on barley may influence spread to wheat and barley farther north, (5) learn cold resistance or tolerance of varieties and new strains, and recommend use of varieties by areas in accordance with known hardiness, (6) give attention to forage characteristics of barley varieties and new strains in developing varieties suited for fall and winter grazing, (7) cooperate in trials of yield, tests of disease resistance, insect resistance, hardiness, and development of multiple factor genetic stocks of value in the breeding program, (8) investigate additional commercial uses for barley, (9) conduct research to increase understanding of practical problems of the crop.

Agron., Pl. Physiol., Pl. Path. 1029, Coop. ARS

W. Va. Breeding Winter Barley for High Yields and Powdery Mildew Resistance. Develop high yielding varieties of winter hardy barley resistant to powdery mildew. Study reaction of available strains to prevalent strains of mildew in field and greenhouse.

Agron., Pl. Genet. 65 (NE-23)

Wis. The Varieties of Barley and Cultural Practices Dealing with the Production of Barley, and Breeding for Malting Quality: Research on Evaluation of Malting Quality of Barley. To breed new barley varieties for economical grain production and good industrial quality.

Pl. Path., Agron. 530, Coop. USDA

Wis. Reaction of Accessions of Barley (Hordeum Spp.) in the World Collections of Small Grains to the Yellow Dwarf Virus. Screen the C.I. collection of barley for resistance to the yellow dwarf virus, and make resistant barley available to breeders.

Agron. 761 (NC-7)

Corn

- Fla. Corn Breeding. To (1) breed improved corn hybrids, with emphasis on higher yields, better standability, and more insect and disease resistance; and (2) study comparative efficiency of different breeding methods.
Agron. 374
- Ga. Corn Breeding. To develop high yielding white and yellow corn hybrids and varieties well adapted to various soil and climatic conditions of Georgia.
Agron. 34
- Ill. Etiology of Pathogenic Organisms Associated with Corn Stalk Rot. To learn (1) pathogenicity of species isolated from corn stalk rots; (2) age of corn plant in which infection begins; (3) mode and source of infection and site of initial infection; (4) possible interaction of different fungi in relation to initial infection.
Pl. Path. 68-351
- Ind. Breeding, Testing, and Distribution of Superior Dent Corn Hybrids. (1) Produce and test new inbreds from open-pollinated varieties, from second cycle inbreds, by recovery from back-crossing, by recurrent selection; (2) dent corn hybrids of superior yield, standing ability, disease and insect resistance, and quality. (3) Breed corn for specific uses. (4) Incorporate cytoplasmic male-sterility and fertility-restoring factors into inbred lines used in hybrid seed production. (5) Maintain, produce, and distribute pure foundation stocks of inbred lines used in approved hybrids. (6) Cooperate with corn breeders to obtain superior hybrids.
Bot., Pl. Path. 973, Coop. USDA
- Iowa The Development of Improved Corn Hybrids. To (1) produce superior inbred lines of corn for different sections of Iowa and the Corn Belt; (2) evaluate lines for combining ability, resistance to, or tolerance of major corn insects, resistance to important plant pathogens, and nutritional and industrial characteristics; (3) compare breeding procedures as to relative efficiency in obtaining desired characteristics to the maximum; (4) use existing data and new data to find most efficient procedures for conducting trials for yield or other desirable agronomic characters; and (5) conduct needed basic studies to facilitate attainment of above objectives.
Agron., Bot., Pl. Path., Chem., Ent. 1140, Coop. USDA

- Ky. Corn Breeding. To produce better inbred lines of corn and better hybrids for use in Kentucky than now grown.
Agron. 155
- Md. Breeding for Better Dent Corn. To (1) continue effort to correct deficiencies in hybrid corn by replacement with new hybrids, or by modifying hybrids now in use, (2) concentrate more favorable genes in the germ plasm of useful inbreds by intercrossing, backcrossing, and selection, (3) evaluate inbreds and their hybrid progenies with regard to general productivity, disease resistance, stalk strength, retention of ears after maturity, tolerance to drought, response to rate of planting, and other characters of agronomic importance.
Agron. B-50, Coop. USDA
- Miss. Corn Disease Investigations in Relation to Breeding for Resistance. Evaluate existing inbred and hybrid lines for resistance to the following: physoderma brown spot, northern corn leaf blight, common corn smut, southern corn leaf blight, helminthosporium leaf spot and ear rot, seedling blight, and other diseases. Incorporate resistance to these diseases into inbred lines being developed. Improve old and develop new techniques for rapid and efficient testing of disease resistance.
Pl. Path. HL-14, Coop. USDA
- Mo. Breeding Hybrid Corn for Missouri. To (1) develop agronomically superior hybrids, (2) develop hybrids for special purposes, (3) conduct investigations in pathological, entomological, and cultural problems, and in breeding techniques.
Field Crops 85 (NC-7) Coop. ARS
- N. J. Study of Some Factors Affecting Corn Yield. To (1) develop cultural improvements and techniques to further increase productiveness of hybrids, (2) determine which hybrids have the ability to produce top yields under intense management and (3) check effect of planting pattern on stalk rot incidence as well as other factors.
Agron., Farm Crops. 228
- N. J. Studies on Diseases of Field Corn. To learn extent of, and control measures for, root and stalk rot; effect of fertilizers on incidence of these diseases; species of leaf blight in state, source of inoculation, and conditions favoring its spread.
Pl. Path., Agron. 476

N. Y.
(Cornell)

Diseases of Field Corn.--1. Stalk Rot Disease of Field Corn. 2. Seed Decay and Seedling Blight. To make a survey of the corn disease problems in New York State; study those of the most economic importance; and conduct experimentation in an effort to devise an adequate control program.

Pl. Path. 131-1 & 2

N. C.

Breeding Investigations for the Improvement of Corn Strains Adapted to North Carolina. To (1) develop strains of corn which are adapted to each area in North Carolina; (2) develop methods of maintaining superior strains and aid in multiplication of such strains; (3) study breeding methods and genetic mechanisms related to corn; and (4) study inheritance of resistant factors in the host to important insects and diseases of corn under local conditions.

Agron., Field Crops 58, Coop. ARS

N. Dak.

Breeding and Development of Corn for the Short Growing Season Areas Prevalent in North Dakota. To (1) isolate new inbred lines of corn which are adapted to the environmental conditions of the short and cool growing seasons of this area and which possess desirable agronomic characters (good ear height) and resistance to diseases (stock rot) and insects (corn borer); (2) improve the plant and seed characters and resistance to diseases and insects of inbred lines now used in early maturing hybrids by outcrossing to selected inbreds of desired character and backcrossing and/or selfing and selection; (3) introduce and study the adaptability of inbred lines originated in other Northern State Experiment Stations for use in North Dakota; (4) intercross and study combining ability and adaptability of selected inbred lines in top, single and double cross combinations as a prerequisite to the recommendation and release of new hybrids for commercial production; and (5) test reaction of North Dakota inbred lines with the cytoplasmic male sterile character for the purpose of possible use of cytoplasmic male sterility in commercial seed production.

Agron., Pl. Path. 6-6

Ohio

Breeding Field Corn for Ohio. To develop strains of corn superior to those now available in the different parts of Ohio.

Agron. 20, Coop. ARS

Okla.

Diseases of Corn and their Control. To (1) isolate inbred lines or other sources of resistance to stalk rot in corn by the process of testing in a cross with susceptible testers to obtain only the dominant types of resistance; (2) extend the testing of inbred lines to include studies on ear rot, first devising satisfactory inoculation method; (3) determine by isolation and inoculation, organisms most prevalent on corn roots; (4) isolate resistant inbred lines as a result of greenhouse and field tests; (5) determine if any ecological relationships exist among various organisms causing root rot in corn; and (6) devise satisfactory method of testing for corn smut resistance.

Pl. Path., Agron. 607, Coop. ARS

Pa.

Disease Resistance in Corn. To (1) continue to produce disease-resistant inbred lines of value to Pennsylvania's corn breeding program; (2) continue to develop and refine techniques for screening resistant material from open pollinated and hybrid populations; and (3) conduct fundamental studies on nature of disease resistance, on factors influencing it, and on its inheritance.

Bot., Agron. 911-B

S. Dak.

The Breeding of Superior Field Corn Hybrids. (1) Develop corn hybrids better adapted for environmental conditions of state; improve yield levels, and lodging resistance as it pertains to root and stalk weakness; work for better drought resistant hybrids; incorporate disease resistance, especially against root rot organisms; breed for insect resistance as corn borer; incorporate male sterility in hybrids available to public. (2) Develop new inbreds which, when used with each other or existing inbreds from various stations, will accomplish objectives in No. 1. (3) Study aspects of plant breeding for improving hybrids as: methods of selection and mating systems, aspects of heterosis, work on methods for developing drought-resistant inbreds, and methods for development of inbred lines through use of chemicals and radiation. (4) Cooperate with experiment stations and USDA.

Agron., Pl. Path. 66

Va.

Diseases of Corn and Breeding of Disease-Resistant Varieties of Hybrid Corn. To (1) develop inbred lines and hybrid varieties of corn with resistance to leaf blight, stalk rot, root rot, rust and smut; (2) culture organisms causing diseases of corn and learn effects of environment on them; (3) study genetics of pathogenicity and variations of causal organisms and related phenomena; (4) develop methods for control of corn diseases and to promote use of known methods; and (5) study inheritance of resistance to corn diseases.

Pl. Path., Pl. Physiol. 86058, Coop. ARS

- W. Va. Corn Genetics and Breeding.--I, Corn Genetics. To study (1) mode of attack, (2) chromosomal translocations with reference to linkage in chromosome 5 and (3) crossing-over in chromosome 1, in a special translocation stock.
Agron. 29, Coop. FES
- Wis. The Development of Superior Strains of Hybrid Field Corn. (1) To breed disease resistant, high yielding varieties of field corn adapted to soils and climate of Wisconsin.
Agron. 309, Coop. ARS,
- Oats
- Ark. Biology and Control of Certain Important Diseases of Oats and Wheat in Arkansas. (1) Develop new or better methods of prevention and control of certain important diseases of oats such as crown rust of oats, leaf rust of wheat (old and new races), oat smuts (old and new races), *Helminthosporium* leaf spot, virus diseases, etc.; (2) identify causal agents and study life cycle and epidemiology of different parasites, except anthracnose, including identification of different races whenever involved; and (3) breed varieties of oats and wheat resistant to these diseases and otherwise desirable.
Pl. Path. 324
- Ind. Oat Breeding, Genetics and Pathology. (1) Develop and evaluate new varieties of spring and winter oats superior in yielding ability, standing ability, quality, and winter hardiness and resistance to crown rust, stem rust, loose and covered smuts, *Helminthosporium* blights, red leaf, and *Septoria* black stem diseases. (2) Learn nature of inheritance of morphological and physiological characters and of disease resistance to extent necessary to carry out a breeding program effectively. (3) Learn economic importance, epidemiology, and physiologic specialization of causal organisms of diseases attacking oats. (4) Evaluate resistance of various types from different sources in relation to diseases concerned.
Bot., Pl. Path., Agron., 819, Coop. ARS
- Ky. The Nature of Resistance and Susceptibility of Oats to Crown and Stem Rust. To determine differential growth requirements of rusts which lead to species and racial specialization.
Agron. 169

- La. Oat Breeding. Primary objective will be to develop varieties of oats which are particularly well adapted to different soil and climatic areas of Louisiana.
 Crops, Soils 373, Coop. USDA
- Maine Variety Testing, Cultural Practices and Fertilization of Small Grains. (1) Develop small grains by introduction, selection and testing. (2) Learn best fertilizer applications, row spacings, seeding dates, and other cultural practices needed for most efficient small grain production.
 Agron. 73, Coop. ARS
- Mich. The Breeding of Superior Oat Varieties. (1) Stabilize variety recommendations through an understanding of major factors in genotype-environment interactions. Develop: (2) superior oat varieties for given localities, e.g., late, white oat varieties for areas of the "thumb", and high night temperature types for Lenawee County; (3) varieties of oats tolerant to Red Leaf and resistant to Septoria as well as to prevalent races of leaf and stem rust; (4) greatly improved lodging resistance to take advantage of increased use of fertilizer. (5) Continue fundamental studies on geometry of yield, particularly as related to heterosis. (6) Measure force of environment on genotype by vector analysis.
 Farm Crops, Bot., Pl. Path. 50
- Miss. Production of Disease Resistant and Cold Resistant Varieties of Oats Adaptable to Mississippi. To (1) develop varieties of oats resistant to major diseases of Mississippi, and having enough cold resistance to supply adequate grazing through the winter; and (2) evaluate selected varieties and strains for grain yields, resistance to old and new diseases, and to cold injury, at several branch stations in the state.
 Pl. Path. HL-2
- Miss. Cause of Spikelet Drop in Oats. To investigate nature of certain new and destructive diseases of small grains in Mississippi with particular emphasis on "Spikelet Drop of Oats."
 Pl. Path. HL-4
- Mo. Breeding and Testing New Strains of Oats for Missouri. To (1) compare best new experimental strains developed in our breeding nurseries, and elsewhere, with standard varieties in search for new varieties, improved in yield, straw qualities, and disease resistance; (2) develop varieties with superior disease resistance, especially to those diseases which are constantly changing as a result of changing physiologic races; and (3) develop varieties with superior resistance to lodging by improving straw strength as well as type of root development.
 Field Crops 203, Coop. ARS

- Mont. Oat Improvement by Breeding, Selection and Testing.
To (1) develop through breeding superior oat varieties with respect to yield, quality, and other desirable agronomic characteristics; (2) test adaptability of new and introduced oat varieties and selections for Montana; and (3) provide information relative to improvement of cultural practices and production techniques.
Agron. 929, Coop. ARS
- N. C. The Development of Winter Oat Varieties with High Yields of Good Quality Grain and with Resistance to Diseases, to Winter Injury and to Lodging. To (1) develop, through breeding, varieties or strains of oats combining the following: a. resistance to crown rust, smut, mosaic, and *Helminthosporium* diseases; b. varieties with stiff straw and with enough winter hardiness to be grown through the State, with exception of very high mountain areas; and c. good yields of high quality grain; (2) evaluate promising new strains from above breeding program, or which may be available from ARS, or other experiment stations; and (3) make survey of oat germ plasm to find types which may contribute to above breeding program.
Field Crops, Pl. Path. H-55, Coop. ARS
- Ohio Oat Breeding and Testing. To (1) develop better varieties of spring and winter oats for Ohio and comparable areas; (2) inform producers of superior and also inferior oat varieties; and (3) develop new concepts and techniques which are needed in this and related fields.
Agron. 32
- Okla. Oat Diseases and Their Control. To (1) develop adequate tests for resistance to crown and stem rust and anthracnose; (2) develop root disease garden where strains of oats can be tested for resistance to root organisms; (3) study variability of *Colletotricum graminicolum* and host range of the fungus; (4) study temperature and moisture needs of infection and disease development; and (5) closely observe breeding nurseries and commercial plantings for new diseases, or for serious outbreaks of diseases usually considered minor.
Pl. Path., Agron. 598, Coop. ARS
- Tenn. Oat Breeding. (1) To improve a winter-hardy oat adapted to Tennessee conditions by hybridization and selection; (2) to obtain a more desirable spring oat resistant to crown rust; and (3) to make genetic studies of characters, strong vs. weak straw, heavy vs. light kernels, resistance vs. non-resistance in the form of crown rust common to this section.
Bot. 80

Tex. Oat Improvement. To (1) develop or discover new varieties of oats superior to present varieties, and adapted to production of grain, forage or a combination of the two from fall or spring seeding, (2) study cold resistance or tolerance of varieties and strains, cooperate in testing hardiness of introduced strains and study nature of winter hardiness in oats, (3) develop oat varieties resistant to crown rust, stem rust, and *Helminthosporium* blight, etc.; (4) study forage and feed quality characteristics of oat varieties and strains under several environmental conditions, and develop varieties especially adapted for grain, winter pasture, hay or oat silage, (5) cooperate with Dept. of Ent. in search for oat germ plasm resistant to greenbugs, etc.; (6) cooperate in regional trials of yield, disease resistance, insect resistance and winter hardiness, and development of multiple factor genetic stocks, (7) conduct research to increase knowledge of practical problems of the crop; study wild and cultivated species related to common oats for characteristics of value.

Agron., Pl. Physiol., Pl. Path. 1027, Coop. ARS

Va. Development of Oat Varieties Adapted to the Coastal Plains Region of Virginia. To develop (1) varieties of oats specifically adapted in growth type to eastern Virginia, high yielding, high in grain quality as measured by bushel test weight, stiff strawed, and resistant to major oat diseases of eastern Virginia; (2) varieties which produce high forage yields for grazing in fall and early spring, and are satisfactory for grazing production either when properly grazed or not grazed; and (3) varieties specifically adapted to high grain production when planted in late winter.

Agron. 86052

Rice

- Ark. Control of Rice Diseases. (1) Develop new disease resistant rice varieties. (2) Find more effective seed treatment compounds. (3) Learn cause and develop control measures for "rice yellows."
Pl. Path. 455, Coop. USDA
- La. Studies on the Kernel Smut of Rice. (1) Develop a suitable method of artificial inoculation of rice. (2) Study genetics of fungus and learn if diploid stage is the only stage in which fungus is capable of inciting infection.
Pl. Path. 933
- La. Fungi Causing Light and Sterile Grains in Rice. (1) Learn to what extent these fungi are responsible for light and sterile grains in rice. (2) Study mechanism of infection and subsequent disease in rice. (3) Screen rice varieties for resistance to these fungi, emphasizing Dr. Wheeler's technique.
Pl. Path. 934

Sorghums

- Okla. Disease Resistance in Sorghums. To incorporate resistance to leading sorghum diseases in new sorghum varieties to replace disease-susceptible standard varieties in the Southwest; thus to reduce annual losses of 10 percent to 20 percent now suffered in sorghum production in this area as a result of sorghum diseases.
Agron., Pl. Path. 481, Coop. ARS
- S. Dak. Breeding and Testing Forage and Grain Sorghums and Sudan Grass. To develop (1) grain sorghums adapted for climatic conditions of state. Place emphasis on high yielding strains that stand longer after killing frost, possess open panicles, larger seeds, greater and sturdier seedlings as well as drought, insect and disease resistance, (2) forage sorghums and sudan grass low in hydrocyanic acid, early maturing and produce high yield of high quality palatable forage, (3) dual purpose large-seeded grain and sweet stalked forage types, low in hydrocyanic acid for silage and fodder, (4) male sterile lines and recover lines for hybrid sorghums, (5) new variants using colchicine, radiation, etc., (6) and evaluate agronomic factors and adaptability of sorghums and sudan grass under climatic and environmental conditions of state, (7) cooperate with near experiment stations and USDA through conferences, testing programs, and exchange of materials.
Agron. 61

Tex. Breeding and Improvement in Sorghum. To (1) improve upon present varieties of sorghum and to develop new and useful varieties through hybridization, backcrossing, and selection; and (2) develop numerous useful strains for practical use of the phenomenon of hybrid vigor in connection with procedures for development of sorghum hybrids being worked out under project 610.

Agron. 499, Coop. ARS

Tex. Studies of Hybrid Sorghum Seed Production. To devise a practical method or methods of producing hybrid seed of sorghum in commercial quantities.

Agron. 610, Coop. ARS

Wheat

Idaho Wheat Breeding for Disease Resistance and Quality. To (1) systematically add rust and smut resistance to those wheats widely grown in Idaho which are not being improved by neighboring states; (2) incorporate a shorter, stronger straw into our better wheats; and (3) conduct preliminary investigations in the inheritance of several genetic unknowns in wheat, particularly quality.

Agron. 220, Coop. ARS

Ind. Soft Winter Wheat Breeding, Genetics, and Pathology. (1) Develop highly productive, pastry quality soft winter wheat varieties, adapted to production under high fertility conditions and resistant to weather, disease, and insect hazards. (2) Learn relations and interrelations of plant characters with respect to yield and adaptation. (3) Analyze inheritance of plant characters contributing to field performance. (4) resistance to hessian fly and wheat diseases. (5) Evaluate superior sources of and characterize resistance to major diseases and insects. (6) Provide data on significance, epidemiology, and genetics of virulence of causal organisms. (7) Evaluate chemical and physical methods of disease control.

Bot., Pl. Path., Agron. 969, Coop. USDA

Kans.

Investigations of Mosaic and Other Virus Diseases of Hard Red Winter Wheat. To (1) discover additional means of virus transmission and spread; (2) find additional sources or reservoirs which harbor the virus; (3) discover more cultural practices which will aid in control; (4) find resistant parental stock for breeding; (5) obtain varieties of hard red winter wheat more resistant than those now grown; and (6) conduct basic research on the virus.

Ent., Agron., Bot. 334, Coop. ARS

Mo.

Breeding and Evaluating New Strains of Soft Wheat with Resistance to Leaf Rust, Loose Smut, and Hessian Fly. To breed an improved strain of soft wheat for Missouri, combining leaf rust, loose smut and Hessian fly resistance in a high yielding strain with good quality, using extensively N fertilizers and working for an early, short, stiff-strawed variety; and comparing any new strains originating from this project with standard varieties to find relative merits, and quality of grain by tests to learn its commercial use.

Field Crops 202, Coop. USDA

Nebr.

Cytogenetic Studies of Economic Characters, Such as Stature and Resistance to Bunt and Rust, in Nebraska Winter Wheats by Means of Aneuploids and Irrigation. (1) Substitute individual chromosomes from Nebraska winter wheat varieties, with immediate emphasis on Cheyenne, into a uniform genetic background, as Chinese Spring, to learn effect of specific winter wheat chromosomes. (2) Develop a set of aneuploid stocks in Cheyenne for use in chromosomal substitutions from other varieties, species, or genera. (3) Locate specific chromosomes of genes for characters as stem rust resistance in Cheyenne and stature in various Nebraska selections. (4) Transfer desirable characters from other varieties, species, or genera to Cheyenne by aneuploids and irradiation-induced translocations.

Agron. 536, Coop. ARS

N. C.

The Development of Soft Red Wheat Varieties with High Yields of Good Quality Grain and with Resistance to Diseases To Winter Injury and to Lodging. Breeding--To develop through breeding varieties or strains of wheat combining as many of these characteristics as possible: 1. resistance to leaf rust, powdery mildew and loose smut, with selection to be made when possible for resistance to other diseases such as scab, glume blotch, and mosaic; 2. high yields of grain of good baking quality and attractive appearance; and 3. stiff straw to stand until ready for combining and sufficient winterhardiness to be grown throughout the state, with special varieties needed for high mountain areas. Testing--To evaluate for characteristics above, promising new strains from local breeding program, from CRD and other state experiment stations. Germ Plasm Survey--To make survey of wheat germ plasm to find types which may be used as parents in above breeding program. Genetics--To determine mode of inheritance of powdery mildew resistance in wheat. The inheritance of other characters may be determined where this information can be obtained by classifying segregating material from breeding program.

Field Crops 56, Coop. ARS

N. Dak.

Hard Red Spring Wheat Improvement. To (1) search foreign wheat collections of USDA for wheat varieties and relatives carrying desirable characters lacking in presently grown commercial hard spring wheat varieties; (2) combine desirable characters by crossing with best commercial varieties and new hybrid selections of hard red spring wheat; (3) make extensive plans and head selection from crosses in segregating generations and test progenies in nursery experiments to establish superiority and adaptability to spring wheat region; (4) establish milling and baking quality characteristics of prospective new wheats; and (5) increase superior wheats for release to growers.

Agron., Cereal Tech. 6-1, Coop. ARS

N. Dak.

Durum Improvement. (1) To find new sources of disease resistance for durum wheat. (2) To evaluate extensive hybrid material for disease resistance including resistance to specific races of stem rust, desirable agronomic types, yield, and semolina quality.

Agron. 6-14, Coop. ARS

Okla.

Breeding of Disease-Resistant Wheats Adapted to Oklahoma. To breed for (1) higher yield through more and larger seeds; (2) grain with higher test weight per bushel and with satisfactory kernel appearance; (3) disease resistance; (4) cold and drought resistance; (5) stiffer straw, non-shattering, and early maturity; and (6) varieties with suitable milling and baking characteristics.

Bot., Chem., Agron. 518, Coop. ARS

Okla.

Diseases of Wheat and Their Control. To (1) continue leaf-rust study to determine prevalent races and shifts in race populations, and watch for new races or build-up of what are now minor races; (2) thoroughly study race separation and identification, including races 21, 54, 105, and 126, which are particularly difficult to distinguish; (3) devise a method of collecting and storing rust samples which will maintain the viability of rust spores as present collections methods cause losses in viability up to 25 or 30 percent; (4) study climatology in relation to winter survival and spring build-up of leaf-rust--establish a comprehensive weather station in close proximity to wheat where weather factors and winter survival can be correlated over a period of several years, and by close correlation of weather, initial inoculum available, and pustule counts to develop a system of predicting rust infection periods; (5) observe varieties and selections in various nurseries to determine their reaction to Septoria leaf blotch, to search for varieties or selections resistant to Septoria, and if possible, to determine how resistance is inherited; and (6) correlate weather records with intensity of Septoria infection to learn what factors control epidemics of the disease.

Agron., Bot., Pl. Path. 772, Coop. ARS

Tenn.

Breeding for Improvement in Wheat Varieties to Include Resistance to Disease, Hessian Fly, and Changes in Morphological Characters. To (1) use present Tennessee lines to add softness and other desirable milling qualities--earliness of maturity, short and stiff straw, smooth or awnless heads; resistance to black chaff, scab, and take-all; (2) incorporate resistance to Hessian fly; (3) select for feed and pasture types in crosses; and (4) test soft wheats for disease resistance in addition to those now available.

Pl. Path. 136, Coop. USDA

Tex.

Wheat Improvement. (1) Develop new varieties of wheat superior to present varieties and adapted to production of grain and/or forage, in state or introduce variety. (2) Study development of varieties resistant to diseases prevalent in each area as leaf and stem rust, smuts, mildew, septoria, and root rots. Breeding and control studies of rusts will be coordinated with Project 983 and will include wheat grown for forage and grain. (3) Cooperate with Arlington College and regional quality lab. of USDA to learn quality characteristics of new varieties and strains. Select best quality strains and learn means of measuring quality characteristics and evaluating strains. (4) Study forage characteristics of varieties and strains and develop varieties suited for winter pasture, hay, or other feed. "Spelt" (non-threshing type) for feed and forage in South Texas will be studied. (5) Learn cold resistance of strains for release. (6) (7) Cooperate with entomologist in search for resistant germ plasm to greenbug attacks, etc. and with states and USDA in regional trials of yield, disease and insect resistance, winter hardiness and development of multiple factor genetic stocks. Grow two generations a year to increase hybrids and promising strains.

Agron., Pl. Physiol., Pl. Path. 1033, Coop. ARS

Wash.

The Transfer of Economic Characters from Related Genera and Species to Common Wheats. To transfer immune or high type of resistance to available races of leaf and stem rust, bunt, mildew, and other agronomic characters, such as solid stems, and shorter, stiffer straw from available Triticum and Agropyron species to stable hexaploid wheat derivatives of value as parents in future wheat varieties.

Agron. 966, Coop. USDA

Wash.

Breeding Wheats Resistant to Stem Rust (Including Race 15B) and Leaf Rust for Washington. To incorporate and test resistance to stem rust, (including race 15B) and leaf rust in new selections for wheat for Washington.

Agron. 1081, Coop. ARS

FIBER AND OIL CROPS

Cotton

- Ariz. Control of Phymatotrichum (Cotton or Texas) Root Rot in Irrigated Lands. To secure fundamental and practical information leading to development of control measures for Phymatotrichum root rot in irrigated lands.
Pl. Path. 42
- Ariz. Verticillium Wilt of Cotton. To study the complete or partial control of Verticillium wilt of cotton.
Pl. Path. 256, Coop. USDA
- Ariz. Breeding Cotton for Disease and Insect Resistance and for Plant Types Suitable for Mechanical Harvesting. To (1) evaluate resistance of present breeding stocks to local diseases and insects and ability for mechanical harvesting, (2) introduce stocks from other localities having similar problems, (3) cooperate in production of high yielding varieties of good spinning quality suitable for mechanical harvesting and (4) provide adequate initial seed stocks of desirable strains for distribution to growers.
Pl. Breeding, Pl. Path. 278 (S-1) Coop. USDA
- Ariz. Influence of Crop Residues on Incidence of Phymatotrichum Root Rot. (1) Assemble data on role of specific crop residues on incidence of Phymatotrichum root rot from laboratory, greenhouse, and field experiments to learn: influence of specific crop residues on Phymatotrichum root rot, and if underlying causes of effects are primarily biological and, if so, the nature.
Pl. Path 417 (W-38)

Ark.

Etiology and Control of the Verticillium Wilt of Cotton in Arkansas. (1) To make a thorough study of morphology and physiology of the pathogen of Verticillium wilt disease of cotton especially from point of view of its pathogenicity under varying climatic and nutritional conditions and to study possibility of biological strains together with the possibility that there are variations arising from an unrecognized sexual process; (2) study reaction of the pathogen to various types of commercial and wild cotton and determine nature of resistance displayed by some of them, and, to a limited extent, by ordinary cotton strains, to this disease; (3) measure by lab, greenhouse and field plot methods degree of resistance of all available selections of upland cotton and other possible breeding material with a view to providing basic material to be used in cotton breeding program to develop suitable commercial cotton varieties for use in Arkansas and other similar areas; (4) determine environmental conditions which modify severity of outbreaks of Verticillium wilt of cotton; and (5) devise methods of controlling or ameliorating severity of attacks of disease through soil amendments, improved cultural methods, rotation, control of soil insects, nematodes, etc. and through use of soil fumigants and fungicides.

Pl. Path. 334

Ark.

Cotton Breeding and Genetics: The Development of Cotton Varieties Having Good Agronomic Properties and Resistance to Verticillium Wilt. To (1) develop breeding stocks of cotton resistant to Verticillium wilt; (2) learn how resistance factor, when discovered, is inherited and how it can be transferred to varieties of commercial importance; and (3) screen advanced breeding lines developed by the station breeder with respect to Verticillium wilt reactions.

Agron. 359

Ark.

Etiology and Control of Certain Soil-Borne Diseases of Cotton. To learn what etiological factors are associated with destructive incidence of Fusarium wilt-root knot complex and devise or improve methods for its control through varietal resistance, soil fumigation, green manuring, better methods of culture and improved fertilization techniques.

Pl. Path. 394

- Ark. Etiology and Control of Seedling Blights and Boll Rots of Cotton. (1) Learn distribution and importance of seedling blights and boll rots of cotton in state. (2) Ascertain virulence of various organisms associated with cotton seedling diseases and boll rots. (3) Study influence of soil types, current cultural practices and previous cropping history on cotton seedling and boll complex. (4) Develop control methods through chemical seed and/or soil treatment, modified cultural procedures and/or varietal resistance.
Pl. Path., Agron. 422, Coop. USDA
- Calif. Study of the Basic Factors Influencing the Development of Strains or Types of Cotton Resistant to Verticillium Wilt. To learn (1) influence of moisture, temperature and nutrition to infection by verticillium wilt fungus and development of disease in cotton, (2) infection court and progression of fungus in plant in relation to symptoms, (3) different strains of fungus as they are related to development of resistant cotton, (4) source of resistance and study inheritance of resistance.
Pl. Path. 1651, Coop. U. S. Cotton Field Sta., Shafter, Calif.
- Ga. Cotton Breeding. To develop (1) a high yielding cotton with a staple of one inch or longer which is wilt resistant and (2) new strains or varieties having superior qualities of disease and insect resistance, earliness, and yielding ability combined with special foliage branching, and picking qualities needed to meet the requirements of mechanized farming.
Agron., Field Crops 26, Coop. USDA
- Ga. Upland Cotton Breeding for Coastal Plain Conditions. To (1) develop high yielding cottons adapted to Coastal Plain areas which possess superior fiber qualities, with emphasis on high fiber strength with acceptable levels of yield and other fiber characteristics, and to screen selected lines for resistance to fusarium wilt; and (2) study methods of preventing damage to seeds and fibers due to high rainfall and high humidity conditions at harvest.
Agron. 203, Coop. USDA
- La. A Study of Insects, Mites and Nematodes Destructive to Cotton and the Development of Economical Means for Controlling Them. To study insects, mites, and nematodes which infest cotton, determine economic importance of the pests, and develop satisfactory and economical methods of control.
Ent. 465, Coop. USDA

- La. A Study of Genetic Factors Involved in Yield Potential, Fiber Quality and Disease Resistance in Cotton. Study: (1) nature of inheritance of and interrelation among quantitative characters concerned with yield and fiber properties in crosses within upland cotton and in crosses between G. hirsutum (upland) and G. barbadense (Sea Island); (2) nature of inheritance of resistance to rootknot nematodes. (3) Evaluate effect of recurrent selection on frequency of desirable genes in crosses between varieties of upland cotton and interspecific hybrids of upland x Sea Island.
Agron. 557 (S-1)
- La. Control of Sore-Shin, The Important Seedling Disease of Cotton in Louisiana. (1) Study various fungicides for sore-shin control under laboratory and greenhouse conditions. (2) Make studies involving application, with special equipment of screened fungicides and effect of these fungicides in field. (3) Work out an inexpensive, practical method of sore-shin control.
Pl. Path. 931, Coop. ARS
- La. Breeding Cotton for Resistance to Major Diseases and Insects. (1) Develop new varieties having combined resistance to rootknot nematodes and Fusarium wilt. (2) Evaluate commercial varieties of cotton recently released by Agricultural Experiment Stations and private companies for resistance to major cotton diseases found in State. (3) Screen genetically divergent types of cotton for resistance to boll weevil, bollworm, aphids, spider mites, Fusarium wilt, rootknot nematodes, seedling disease due to Rhizoctonia and boll rot to be used in breeding new varieties with resistance to these pests and diseases.
Agron. 949, Coop. ARS
- Miss. Investigation of the Seedling Diseases of Cotton and Their Control Under Mississippi Conditions. To (1) evaluate value of various chemical seed treatment materials for prevention of diseases of cotton seedlings and determine other characteristics of these chemicals which would be of benefit to seedsman and farmer; (2) study post-emergence diseases of cotton and attempt to develop effective control measures; and (3) study seed-borne diseases of cotton and attempt to determine feasibility of disinfecting cotton seeds of seed-borne pathogens.
Pl. Path. HL-5, Coop. USDA

Miss.

Investigation of the Diseases of Cotton and Their Control Under Mississippi Conditions. To (1) develop greenhouse and field techniques to determine resistance and susceptibility to certain cotton diseases; (2) investigate seed stocks and sources now available, and those becoming available, for resistance to major cotton diseases, and incorporate any resistance found into types suited to this region and culture; (3) study genetics of resistance; and (4) design and conduct work on other forms of disease control where such control is necessary and appears feasible.

Pl. Path. HL-6, Coop. USDA

Miss.

Inheritance Studies Concerning Yield, Fiber Properties, and Disease and Insect Resistance in Upland Cotton. To (1) classify and isolate as far as possible factors which affect yield, fiber properties, and disease and insect resistance, (2) learn when possible genetic ratios expressed by simply inherited factors and number of factors involved where inheritance is more complex; and (3) learn at what stage in cotton development, specific factors are operating to produce ~~and~~ results observed.

Agron. RRFU-1-c (S-1) Coop. ARS

Mo.

The Diseases of Cotton of Missouri. (1) Learn diseases of economic importance and describe those found to be new. (2) Make crop yield loss estimates due to diseases. (3) Learn resistance rating of present breeding lines and varieties to the common diseases of cotton, search for high types of resistance to cooperate with plant breeder in development of new, more resistant varieties. (4) Learn optimum and limiting environmental factors for disease development, search for cultural methods of control and obtain data on etiology, host-parasite relations, and epidemiology of diseases of cotton. (5) Test established and newly developed chemicals and antibiotics for possible effective economical control of seedling and mature plant diseases. (6) Study available methods of inoculation for inciting epiphytotics and develop new techniques for the study of the diseases of cotton.

Field Crops 322

N. Mex.

Breeding Upland Cotton and the Evaluation of Strains and Varieties for Southern New Mexico. To (1) develop strains or varieties of upland cotton that have the following characteristics: high yield, early maturity, strong seedling vigor, high tensile strength, high degree of fiber maturity, desirable degree of fineness, staple length of 1-1/16 to 1-1/8 inches, superior spinning quality, resistant or tolerant to Verticillium wilt, resistant to bacterial blight, (2) determine adaptation of strains and varieties produced in this and other breeding programs to the different producing areas of New Mexico, (3) estimate grade and staple of cotton produced in New Mexico.

Agron. 12

N. Mex.

Variety Test of American Upland Cottons Suitable for Combed Yarns. Learn the adaptation of selected high quality American Upland cotton varieties to southern New Mexico as measured by: yield of lint, boll size, gin turnout, lint index, seed index, earliness of maturity and seedling emergence; fiber properties as Upper half mean length, length uniformity ratio, fineness, maturity, strength and elongation; yarn strength and appearance grades, nappiness, comber waste and occurrence of ends down; tolerance to Verticillium wilt.

Agron. 19

N. Mex.

The Genetics of Bacterial Blight Resistance and the Value of Osmotic Selection in Upland Cotton. To (1) determine genetic basis of resistance to blight, including problems of allelism, gene interaction, pleiotropy, and linkage; (2) use induced mutation to obtain blight resistance in agronomically desirable but susceptible material, as well as to obtain new types of resistance; (3) determine if and in what way osmotic selection can be of benefit in applied cotton breeding work, and (4) perfect techniques for using osmotic selection to best advantage with cotton.

Agron. 45 (S-1) Coop. AMS

Okla.

New Developments in the Use of Fungicides for Cotton Seedling Disease Control. To protect cottonseed against decay and cotton seedlings against damage from seedling disease pathogens.

Bot., Pl. Path., Agron. 482, Coop. ARS

Tenn.

Control of Cotton Verticillium Wilt. To (1) develop means to reduce loss from the disease by study of contributing environmental factors, determining range of the disease in Tennessee, differentiating incidences of Verticillium and Fusarium wilts, determining means of spread of causal organism, and developing cropping systems to restrict further spread and minimize losses where disease now exists; (2) study use of fungicides, soil fumigants, and antibiotics to reduce incidence of the disease; and (3) breed a Verticillium and Fusarium wilt-resistant upland cotton acceptable to Tennessee.

Pl. Path. 135

Tex.

The Seedling Disease Complex of Cotton. (1) Extend and intensify existing knowledge of occurrence and importance of fungal pathogens of cotton seedling disease complex in terms of geography and soil type. (2) Establish standard physiological responses for principal species of complex, as: cardinal temperatures, growth on standard artificial and synthetic media, growth in soils of different levels of moisture and organic matter. (3) Develop system of seedling disease grades reflecting relative symptomatology on quantitative basis and adaptable to current statistical methods. (4) Evaluate in terms of disease grades, responses of major commercial varieties and representative genetic types of cotton to seedling disease complex in soils at controlled temperature levels. (5) Cooperate with existing programs in selecting for tolerance of seedling diseases within current material, or in adding tolerance by hybridization and selection. (6) Examine prior treatment of seed, as to fuzzy, reginned, acid-delinted or flamed, in light of possible predisposition to seedling disease. (7) Evaluate selected chemicals, applied to seed prior to planting or mixed in covering soil, as means of controlling losses from seedling disease.

Pl. Physiol., Pl. Path., Agron. 990, Coop. ARS

Tex.

The Influence of Physiological Factors on the Expression of Parasitic Diseases of Cotton. To (1) study relation between organic and inorganic content of cotton seeds and their susceptibility to seedling diseases, (2) learn relationship between the supply of major and minor nutrient elements and resistance of cotton to bacterial blight, and (3) learn effect of increased concentrations of certain minor elements in cotton seeds on seedling disease resistance.

Pl. Physiol., Pl. Path., Agron. 1007, Coop. ARS

Tex. Biological and Chemical Factors Influencing the Cotton Root Rot Fungus, *Phymatotrichum Omnivorum*. By biochemical, microbiological, and physical procedures establish interrelations between cotton root rot fungus and its environment, emphasizing: (1) influence of chemical and physical factors operating in soil on mycelial development and formation of sclerotia; (2) factors involved in longevity and breaking of dormancy of sclerotia; (3) evaluation of role of con-comitant soil microorganisms; (4) effect of fungitoxic chemicals on growth and activity of *Phymatotrichum omnivorum*; (5) isolate and study compounds secreted by root rot fungus; (6) development of improved criteria for evaluating actual infestation status of disease potential of field situations.

Pl. Physiol., Pl. Path. 1102, Coop. ARS

Flax

N. Dak. Breeding and Genetics of Flax. To (1) develop varieties of flax with desirable agronomic qualities--high resistance to wilt *Fusarium lini*; resistance to races of rust; tolerance to pasmo, *Sphaerella linorum*; and quantity and quality of oil, and seed yielding ability; and (2) determine if some relationships exist between reaction to rust and other characters of flax.

Pl. Path., Chem., Agron. 6-13, Coop. ARS

N. Dak. Preservation of Certain Physiologic Races of Flax Rust *Melampsora lini*. To (1) preserve and maintain in uredinial stage races of flax rust having desired genes for virulence on selected flax varieties; and (2) test material for flax breeders who desire such assistance, or furnish them on request specific cultures for such testing.

Agron., Pl. Path. 13-1 (NC-7) Coop. ARS

Tex. Flax Improvement. To (1) develop or discover new varieties of flax better suited to Texas than now available, (2) search for greater cold resistance among imported or domestic strains and hybrid material, (3) cooperate in testing domestic and imported strains for sources of disease resistance, cold resistance and agronomic characteristics of value in the program, (4) test rate and date of seeding, fertilizer needs of crop and cultural methods for flax, (5) cooperate in control tests of nematodes and insects which attack flax.

Agron., Pl. Physiol., Pl. Path. 1028, Coop. ARS

Peanuts

- Ala. Cause and Control of Collar Rot on Peanuts. To (1) determine cause or causes of collar rot of peanuts; and (2) develop control measures.
Bot., Pl. Path. 546
- Ga. Control of Southern Blight (*Sclerotium Rolfsii*) on Peanuts. To develop (1) well integrated practicable schemes of culture that apply the fundamental requirements for control of southern blight on peanuts and other crops; and (2) implements which will obtain these cultural requirements in widely different types of soil.
Pl. Path., Ag. Eng., Hort., Agron. 102, Coop. USDA
- Ga. Peanut Breeding and Improvement. Develop high yielding, disease resistant varieties of peanuts; conduct basic studies in inheritance of characters of economic importance, involving genetic studies of peanut and related species, inter- and intra-specific hybridization and cytogenetic investigations of breeding materials; evolve improved production practices in collaboration with specialists in various phases of peanut production research.
Agron., Pl. Path. 204
- N. C. Peanut Breeding and Cultural Investigations. To develop strains of peanuts with greater yielding ability, high oil content, and superior disease resistance; and to learn the relative response of different types or varieties, as measured by both yield and quality, on different soil types and to various cultural practices.
Field Crops H-50, Coop. USDA-AEC
- N. C. Etiology, Epiphytology and Control of Soil-Borne Diseases of Peanut. To (1) obtain basic information on influence of environmental factors, cropping and cultural practices, soil microflora, and varietal susceptibility upon severity of soil-borne diseases of peanut caused by various bacteria, fungi, and nematodes; and (2) use such basic information in developing effective, practical control measures.
Pl. Path. 88

- Tex. Improvement of Peanuts Through Breeding and Selection.
To (1) develop new varieties and strains of Spanish type peanuts with resistance to Southern blight, and Cercospora leaf spots, high yielding ability, uniformity of shape and size of seed, and seed dormancy; (2) increase emphasis on assembling and testing of new peanut breeding materials for a substantially higher order of resistance to major diseases; (3) conduct hybridization and selection within groups of new and old breeding materials in the direction of combining high disease resistance with other outstanding characteristics; and (4) use all available genetic techniques in reaching the above objectives, including chemical and radiological methods of modifying germ plasm.
Pl. Path., Pl. Physiol., Agron. 569
- Tex. Diseases of Peanuts. To study major diseases of peanuts in Texas and develop practical measures toward their control.
Pl. Physiol., Pl. Path. 605, Coop. USDA

Soybeans

- Ga. Breeding, Culture, and Fertilization of Soybeans in Georgia. To (1) develop disease resistant varieties of soybeans that can be profitably grown in Georgia for these uses: for hay that will give good forage yields and abundant seed, for hogging-off with low oil content that hold seed well and produce high seed yields, and for edible varieties that will make suitable green vegetable beans or dry beans; (2) determine environmental factors which prevent seed setting and development of varieties resistant to these factors; and (3) determine effect of lime and fertilizer nutrients on yield of seed and hay, and on oil content.
Agron. 29
- Ind. Host Relationships, and Methods of Control of Diseases of Soybeans. (1) Learn prevalence and economic importance of diseases of soybeans. (2) Identify causal organisms, their life histories, pathogenicity, epidemiology and methods of infection. (3) Develop disease resistant varieties and other appropriate control measures.
Bot., Pl. Path., Agron. 970, Coop. ARS

Iowa

Development of Superior Soybean Strains. To (1) develop new soybean varieties adapted to the various climatic and edaphic conditions in Iowa and superior to those now grown in respect to yield and other agronomic characters, in chemical composition, and in resistance to the major diseases, (2) cooperate with Regional Soybean Laboratory, FCRB-ARS, USDA, in regional testing of soybean varieties developed in other states in this region, (3) determine value of different breeding methods in soybean improvement and to develop more effective methods of selection, (4) obtain basic data on the inheritance of and nature of gene action conditioning the expression of agronomic characters, chemical composition, and disease resistance, (5) determine the nature of host-parasite relationships for each of the major soybean diseases, (6) evaluate the disease reaction of breeding material developed in this program and such other sources of germ plasm as may be of potential value in soybean improvement, and (7) determine factors that influence the development of soybean diseases including mode of transmission and establishment in the host and the effect of environmental factors on establishment and development of the disease infection.

Farm Crops, Pl. Path., Agron., Bot. 1179, Coop. ARS

La.

Soybean Breeding. To develop varieties of soybeans which are particularly well adapted for the production of seed, forage and soil improvement under varying soil and climatic conditions in Louisiana.

Agron. 134, Coop. USDA

Minn.

Epidemiology of Leaf Spots and Other Foliage Diseases of Crop Plants.--III. Soybean and Legume Crops. To study prevalence and distribution of diseases of soybeans and other legume crops.

Pl. Path., Bot. 2219-3

Mo.

Improvement of the Missouri Soybean Crop. (1) Secure information on performance of new strains of soybeans in comparison with standard varieties in various parts of state. (2) Develop varieties with improved agronomic and chemical characteristics and with improved resistance to disease. (3) Secure information on effect of date of planting, rate of planting, etc., on performance of new and standard varieties; (4) certain questions of importance in breeding and production of soybeans.

Field Crops 49, Coop. USDA Regional Soybean Laboratory

N. C.

The Breeding of Grain-Type Soybean Strains that are Superior to Existing Varieties in Agronomic Characters and Possess Resistance to the Common Diseases. To (1) develop soybean strains that are resistant to shattering and lodging and that produce high yield of good quality seed that are high in oil and protein; and (2) study inheritance of resistance to certain diseases and to transfer resistance to these diseases and resistance to bacterial pustule to strains possessing good agronomic characters.

Agron. 54, Coop. ARS

Ohio

Development and Evaluation of Improved Varieties of Soybeans for Farm and Industrial Utilization. To (1) develop by introduction, hybridization and selection improved strains of soybeans adapted to Ohio; (2) cooperate through U. S. Regional Soybean Lab in interstate programs of exchange and evaluation of basic breeding, stocks, segregating populations, and promising new strains originating from breeding programs of all cooperating states; (3) make genetic studies as they may affect methods of breeding and field plot technique; (4) assist in orderly, effective program of increase and early distribution of foundation seed of new improved strains; and (5) evaluate breeding material to existing varieties in regard to reaction to soybean diseases prevalent in Ohio.

Bot., Agron. 46

S. Dak.

The Breeding and Testing of Soybeans, Sunflower, Safflower, and Castor Beans for South Dakota. To (1) develop and test new strains (as in title) especially adapted to South Dakota; (2) locate new sources of earliness, drought, disease and insect resistance, and quality for use in breeding superior varieties; (3) cooperate with stations of adjacent states and USDA by participating in conferences and exchanging breeding materials and information on improved methods, techniques and varieties; and (4) study fundamental problems of breeding behavior of these crops.

Agron. 148

Other Crops

- Ind. Control of Diseases of Peppermint and Spearmint. Study (1) control of important diseases of said plants through disease resistance, (2) value of foliar and soil application of chemicals in combination with other cultural practices for control of Verticillium wilt, (3) value of new fungicides for control of mint anthracnose, rust, mildew, and other foliar and root diseases, (4) mechanisms of pathological wilting of plants infected with Verticillium albo-atrum.
Pl. Path., Bot. 842, Coop. ARS
- Mich. Investigations on the Verticillium Disease of Mint. To produce by breeding a new strain of peppermint resistant to the Verticillium wilt disease of mint.
Bot., Pl. Path. 37

SUGAR CROPS

Beets

- Colo. The Effects of Previous Cropping Practices on the Incidence of Root Diseases of Sugar Beets. To learn (1) effects of previous cropping practices on development or suppression of said diseases, (2) effect of crop residue on soil microbiological populations, (3) value of control measures for pre- and post-emergence damping-off with application of crop residues to soil at time of planting.
Pl. Path. 231 (W-38)
- N. Mex. Testing Sugar Beet Strains and Varieties for Curly-Top and Leaf Spot Resistance. To (1) test strains and varieties of Sugar Beets for yield, percentage sugar, size and shape of beets, and resistance to curly-top and leaf spot; (2) increase in isolated plantings, seed of select mother roots which have characters sought in objective 1; and (3) increase select seed lots in isolated plantings to make seed available for commercial plantings.
Agron. 9, Coop. ARS

Mont. Development by Testing and Selection of Varieties of Sugar Beets Resistant to Aphanomyces, Rhizoctonia, and Fusarium Root Rots. To (1) test resistance of new varieties of sugar beets to Aphanomyces, Rhizoctonia, and Fusarium root rots; and (2) learn if resistance is correlated with certain environmental factors such as temperature, percentage of moisture in soil, soil type, and soil nutrients, and learn reaction of various strains of these organisms on best varieties.

Bot., Bact. MS916

Nebr. The Etiology and Control of Soil-Borne Diseases of Sugar Beets. To determine (1) identity of the organisms causing pre- and post-emergence damping-off of seedlings, root rots, wilt, and storage rots following these diseases, and effect of cropping systems, cultural practices including seed treatments, soil types, and environmental factors on occurrence of these diseases; and (2) factors for resistance, and discovery of resistant parent stocks.

Pl. Path. 314, Coop. USDA

Cane

La. A Study of a Species of Pythium in its Action on Sugar Cane. The effect of environment will be studied by growing corn and cane under different conditions of temperature, moisture and acid, with Pythium both absent and present, and best temperatures will be determined for infection by work with incubators. Infection will be studied by inoculating roots with Pythium and sectioning on the microtome, giving the methods of entrance and spread. Various soils will be used, some washed and steamed, to determine soil relation to development of rot and infection. Root systems of the newer varieties will be studied in regard to susceptibility to infection. Antibiotic organisms from the soil will be isolated and studied to determine their role in the soil and in infection.

Pl. Path. 205

La. To Develop New Varieties of Sugar Cane. To develop through the breeding of pedigreed sugar cane new varieties and strains which will improve yields per acre.

Sugar Cane Station 370, Coop. USDA

- La. Studies on Sugar Cane Diseases. To (1) study cause and control of diseases of sugar cane with special emphasis on Phytophthora rot, mosaic, red rot and root rot; (2) develop information on resistance of cane varieties to major diseases of sugar cane; and (3) investigate nature of seed cane failures and stubble failures and develop methods of control.
Pl. Path. 766
- La. The Ratoon Stunting Disease of Sugar Cane. To determine (1) presence of ratoon stunting virus or a similar one in Louisiana; (2) role of virus in degeneration of varieties which apparently are senescent; (3) if hot water treatment will permit development of virus free seed stocks; (4) all modes of spread of the disease to aid control; (5) a means other than inoculation to identify virus in stalks either not obviously stunted or in area where environment is not productive of good growth; (6) inheritance of resistance to obtain production of new resistant varieties; and (7) environmental factors responsible for severity of the disease.
Pl. Path. 773
- La. Fundamental Studies on Sugar Cane Diseases. (1) Learn nature of causative agent of ratoon stunting disease of sugar cane; (2) learn specific diagnostic methods for disease. (3) Develop additional control methods for the disease.
Bot., Bact., Pl. Path. 910
- P. R. Sugar Cane Breeding. To develop by hybridization new and superior varieties of sugar cane resistant to mosaic and other diseases.
Agron., Hort. 38
- P. R. The Study and Control of Ratoon-Stunting Disease of Sugar Cane in Puerto Rico. (1) Test reaction of varieties available in Puerto Rico to a stunting-disease virus. Learn (2) which is most effective curative heat treatment under Puerto Rican conditions; (3) method of increasing significantly the germination of heat-treated canes. (4) Develop more rapid and accurate methods of diagnosis. Study (5) host range of virus among wild and cultivated grasses and other plant families; (6) properties of causal virus. Explore: (7) possible occurrence of strains of virus and study them if evidence of their presence is found; possible occurrence of insect vectors of virus.
Pl. Path., Agron., Ent. 123, Coop. ARS

TOBACCO

Viruses

- Calif. An Investigation of the Mechanism of Tobacco Mosaic Virus Reproduction. To learn more about intimate details of plant virus reproduction.
Bot. 1664

- Ky. Virus Diseases of Tobacco, with Special Reference to Streak. To study the virus that causes streak of tobacco to determine: (1) natural method of spread of the virus, (2) natural host range of the virus, and (3) properties of the virus.
Agron. 154

- Mass. The Improvement of Havana Seed Tobacco. To improve Havana Seed tobacco inherently by breeding new strains of tobacco which combine high resistance to black root rot, common tobacco mosaic, and wildfire, with habits of growth and yielding capacity that are highly acceptable to growers, and, also, the capacity to produce tobacco of type of quality that are highly acceptable to cigar manufacturers.
Agron. 4

Others

- Fla. Flue-Cured Tobacco Improvement. To develop varieties of flue-cured tobacco of good type and yield combined with resistance to nematodes and other pests.
Agron. 372

- Ky. Breeding Studies with Tobacco. To (1) develop tobacco varieties resistant to black root rot, mosaic, brown root rot, fusarium wilt, angular leaf spot, wildfire, streak virus, and black shank; (2) improve smoking qualities of burley tobacco by crossing with Turkish tobacco and selecting for aromatic strains, and (3) develop smoking tobaccos of satisfactory quality that are extremely low in nicotine content, and other strains having a maximum total alkaloid content of about 2.5 percent.
Agron. 152

- Md. Development of Improved Strains of Maryland Tobacco Resistant to Diseases. To develop improved strains of Maryland tobacco resistant to major diseases of tobacco, as mosaic, black root rot, wildfire, black shank, Granville wilt, and fusarium wilt.
Bot., Agron. J-95, Coop. ARS

N. C.

The Control of Tobacco Diseases by Soil Fumigation.

(1) Learn effectiveness of soil fumigants against parasitic nematodes and other soil borne organisms pathogenic in tobacco. (2) Study dosage, method of application and treatment conditions for fumigants used in soil. (3) Learn effects of soil fumigants on yield, grade distribution, and value of tobacco and on chemical composition of cured leaf. (4) Formulate recommended procedures for soil fumigation practice.

Pl. Path. 92

P. R.

Tobacco Breeding. To obtain cigar-filler and chewing types of tobacco resistant to tobacco-mosaic virus, Marmor tabaci Holmes, and adapted to Puerto Rican conditions.

Agron. 62

Tenn.

Production of Burley Tobacco. To study (1) influence of soil type and fertilizer, manure, and liming treatments on yield and quality of leaf, (2) effect of preceding crops and length of crop rotation on yield, quality, and disease control, (3) hybridization and selection, with special regard to disease resistance, for strains better adapted to Tennessee conditions, (4) influence of curing conditions on quality of leaf, and (5) effect of cultural practices on yield and quality.

Agron. 37, Coop. USDA

Tenn.

Breeding Disease-Resistant Tobacco. Develop a dark tobacco resistant to diseases of economic importance. Incorporate such resistance into acceptable varieties. Refine by breeding, lines so obtained, into a high yielding variety that will bring a high market value under existing requirements. Test under local conditions all lines of tobacco that may offer control of prevalent diseases by utilizing resistance, and to evaluate same for market quality.

Pl. Path., Hort. 132, Coop. USDA

Va.

Investigation of Some Aspects of the Etiology and Control of Tobacco Root Rot Disease-Complexes. To investigate as many different aspects of the etiology and control of tobacco root rot disease-complexes as possible, in an effort to improve vigor, quality, and per acre yield of tobacco crop in the area as measured by per acre value of the crops.

Pl. Path., Pl. Physiol. 86013

- Va. Breeding Tobacco for Disease Resistance. To (1) develop through breeding and selection, high yielding and quality strains of flue-cured, fire-cured and burley tobacco resistant to the major tobacco diseases, including black shank, Granville wilt, mosaic, root knot, root rot, and the nematode-root rot complexes, with attempt made to incorporate blue mold resistance into the best strains, and in the case of burley, to also include wildfire resistance; and (2) determine genetic behavior of resistance in tobacco to several diseases under investigation in order to predict possibilities from breeding with a high degree of certainty.
Pl. Path., Pl. Physiol., Agron. 86018

FORAGE, TURF, AND COVER CROPS

General

- Ala. Breeding of Sericea Lespedeza, Crimson Clover and Vetch. To (1) develop improved variety of sericea that is more palatable, more nutritious, disease-resistant and higher yielding; (2) develop higher yielding, more disease-resistant, non-shattering, hard-seeded variety of crimson clover producing earlier fall grazing; (3) develop vetch capable of producing high yields of green matter and seed; and (4) determine which varieties of certain legumes now available are best adapted as green manure crops for general use in the state.
Agron., Soils 404
- Ark. The Control of Diseases of Forage Legumes and Grasses. To (1) determine distribution and identity of plant diseases on forage and pasture crops; (2) determine host range of certain parasitic diseases on forage and pasture crops in order that a sound approach may be made on investigations involving rotation as well as other means of control; and (3) investigate means of control by: seed treatment, cultural practices, applications of fertilizers, testing varietal resistance, and developing disease resistant varieties.
Pl. Path. 384
- Fla. Forage and Pasture Grass Improvement. To develop more desirable forage and pasture types of grasses resistant to important diseases.
Agron. 298, Coop. ARS

- Ga. The Introduction, Testing and Improvement of Forage and Pasture Plants. To secure, test, and select strains of forage and pasture crops better adapted to Georgia conditions.
 Forage, Pl. Path., Agron. 39, Coop. USDA
- Ga. The Improvement of Tall Fescue Grass and White Clover Through Breeding and Selection. To (1) investigate compatibility of interspecific Festuca crosses and inter generic Festuca-Lolium crosses, and learn relative value of any progenies obtained; (2) maintain genetic stocks of fescue and white clover and obtain data on breeding behavior; (3) evaluate spaced plants on white clover and fescue relative to differences in forage and seed production, persistence, disease reaction, animal preferability, and nutritive value; (4) combine selected clones or hybrids of fescue and white clover into synthetics and evaluate combinations as strains for release in South; (5) evaluate available varieties, strains, and ecotypes of fescue and white clover.
 Agron., Anim. Ind., Pl. Path. 41 (S-12)
- Ga. Diseases of Forage Crops. To (1) learn incidence, distribution, and importance of diseases of forage plants in Georgia, and to describe and learn the etiology of new or imperfectly known diseases; (2) learn relationships among species and strains of Rhizoctonia infecting forage plants; (3) learn relationships among species of Helminthosporium occurring on forage grasses; and (4) promote control of diseases of forage plants by providing breeders and agronomists with technical assistance in the development of disease resistant varieties and improved pasture management practices and by determining effectiveness of seed treatment in control of seedling diseases.
 Pl. Path., Agron., Forage 101
- Ind. Evaluation of Legume and Grass Introductions. Evaluate, summarize, and distribute to interested personnel the data on alfalfa, red clover, and cool season grasses and make any superior plants obtained available for breeding programs in the region.
 Bot., Pl. Path., Agron. 890 (NC-7)
- Kans. Diseases of Forage Grasses and Legumes. To learn, (1) major diseases of forage grasses and legumes occurring in Kansas, (2) control measures, i.e., resistant varieties, chemical control, or cultural practices.
 Bot. 434, Coop. ARS

- Maine Diseases of Forage Crops. To determine (1) most important diseases affecting yield, quality, and maintenance of stands of various legumes and grasses, (2) effect of management practices and soil treatments on diseases responsible for loss of stands, especially ladino clover, and (3) susceptibility of varieties of legumes and grasses to the diseases causing loss of stands.
Pl. Path. 50, Coop. ARS
- Minn. Epidemiology of Leaf Spots and Other Foliage Diseases of Crop Plants.--I. Forage Crop Diseases. To gain information on prevalence, etiology, epidemiology, physiologic specialization, and methods of control of diseases of forage crops in order to improve their potential values as farm crops.
Pl. Path., Bot. 2219-1
- Minn. Epidemiology of Leaf Spots and Other Foliage Diseases of Crop Plants.--III. Soybean and Legume Crops. To study prevalence and distribution of diseases of soybeans and other legume crops.
Pl. Path., Bot. 2219-3
- Miss. Forage and Pasture Crop Breeding. To collect, introduce, isolate by selection, or to develop by hybridization, superior Dallisgrass, Johnsongrass, sorghum x Johnsongrass segregates, ryegrass, and crimson clover for the South.
Agron., Crops HC-2 (S-12) Coop. USDA
- Miss. Investigations on Forage Crop Diseases and Their Control. To (1) investigate parasitic and non-parasitic diseases of forage crops in Mississippi and appraise their importance to the farmer; and (2) find control measures for most important diseases of these crops by means of protection, eradication, disease resistance, or other methods.
Pl. Path. HL-15
- Miss. Investigations of Virus Diseases of Forage Crops. (1) Learn what viruses, or virus complexes, are present on forage crops in state, the extent of their range and damage, and study host range, nature, and transmission. (2) Search for practical control measures for more important virus diseases.
Pl. Path., Pl. Physiol. HL-16, Coop. USDA

- Nebr. Miscellaneous Legume Problems. To learn (1) if seed inoculation is needed in areas where a legume is to be grown for first time, (2) influence of chemical treatment of legume seed either prior to or following inoculation with proper rhizobia strain, on root nodule development, yield of vegetative material and production of crude protein, (3) if failure of some leguminous species to nodulate is due to nodulation being inherently delayed in life cycle, (4) if nodulation can be accomplished by applying inoculant to other materials that would be placed close to seed in form of a band at planting, (5) influence of seed scarification on inoculation and nodulation, (6) if hull on seed of Korean lespedeza contains a substance which inhibits germination and nodulation.
Agron. 517, Coop. ARS
- N. Y.
(Cornell) Diseases of Forage Crops. Subprojects: (1) Bacterial Wilt of Alfalfa; (4) Survey of Forage Crops Diseases in New York; (5) Influence of Plant Disease Upon Legume Maintenance in Meadows and Pastures.
Pl. Path. 135
- R. I. Control of Forage Crop Diseases. To develop agents and/or methods for economical prevention of forage losses due to fungi.
Pl. Path., Agron. 608, Coop. ARS
- Tex. Grass and Legume Seed Production. To determine (1) areas well adapted to seed production of important forage species; (2) influence of fertilizer treatments and cultural and management practices on seed production and quality; (3) effect of fertilizer treatments and management on incidence of diseases and their effect on seed yield and quality; (4) importance of using pollinating insects and controlling harmful insects; and (5) adaptation of harvesting and planting equipment for particular species and to fit peculiar needs of various regions.
Agron. 860 (S-12) Coop. ARS
- Va. Effect of Fungicides and Nematocides on Control of Soil-Borne Diseases of Forage Crop Plants. To (1) test fungicides and nematocides for control of root and stem diseases of forage crops; (2) evaluate fungicidal properties of herbicides that may be used on forage crops; (3) determine effect of controlling winter weeds on disease incidence of alfalfa and clover; and (4) evaluate certain soil-applied insecticides for controlling root- and stem-feeding insects in relation to prevention of root and stem diseases.
Ent., Pl. Path., Pl. Physiol. 86014

- Va. Diseases of Pasture and Forage Crops. To (1) determine strain of stem nematode of alfalfa present in Virginia and to develop a rotational sequence effective in controlling the disease, (2) determine by survey extent of stem nematode infestation in the state, (3) learn effect of other plant parasitic nematodes upon the several forage legumes and grasses, (4) study leaf pathogens of orchard grass (Puccinia graminis and Scolecotrichum graminis) as to their pathogenic variability, influence of environmental factors upon their development and greenhouse inoculation techniques for evaluating resistant clones, (5) to learn disease incidence of the uniform red clover nursery supplied by Division of Forage Crops and Diseases of USDA, (6) assist plant breeders in evaluating lines of birdsfoot trefoil brome grass, alfalfa, and orchard grass for disease resistance from field observations.

Pl. Path., Agron. 86066, Coop. ARS

Grasses

- Ind. Breeding and Selection of Forage Grasses of Agricultural Value and Local Adaptation. To develop by breeding and selection high yielding varieties of forage grasses well adapted to soil and climatic conditions of Indiana.

Agron. 760 (NC-11)

- La. The Improvement of Dallis Grass (Paspalum Dilatatum) for Seed and Forage Production. To (1) Develop new strains, varieties or types better suited to Louisiana and the southern region for forage and seed production; (2) determine extent apomixis exists in reproductive process of Dallis grass.

Agron. 484

Mass.

Breeding Improved Strains of Orchard Grass (Dactylis Glomerata L) for Massachusetts and the Northeast. To select uniform strains of orchard grass, through inbreeding and hybridization, with the following desirable features: 1. winter hardiness--most late maturing strains are susceptible to winter injury, so winter hardiness must be combined with late maturity; 2. late maturity--this is essential in order that the grass will not become coarse and unpalatable early in the season, and also in order that it will reach silage or hay stage at the same time as the first cutting of alfalfa; 3. leafiness--this contributes the nutritive value and also the palatability; 4. resistance to lodging--ability to stand up under heavy nitrogen fertilization will prevent waste and also facilitate harvesting operations; 5. resistance to diseases--although no specific diseases appear to be serious at present, the plant breeder must always be on the alert for disease problems; and 6. sustained productivity--high forage yield for several years and good recovery after grazing or cutting are of great economic importance to the farmers.

Agron. 11

N. H.

Improvement of Smooth Brome grass, Red Clover and Alfalfa. (1) Develop an improved variety of smooth brome grass with resistance to brown leaf spot (Pyrenophora bromi), better summer production, and greater leafiness and vigor. (2) Test alfalfa, brome grass, and red clover for persistence and adaptation.

Agron. 116

N. C.

The Improvement of Orchard Grass and Tall Fescue Through Breeding. (1) Study plant to plant variation in orchard grass and tall fescue at a high level of nitrogen fertilization. (2) Use information in breeding of improved orchard grass and tall fescue for use in mixtures and in pure stands.

Field Crops 65

Oreg.

Studies on the Relationship of the Mite Pediculopsis Graminum Reut. to Silver Top Disease in Oregon Grasses. (1) Study biology of Pediculopsis graminum Reut. and its relation to Fusarium poae. (2) Learn how other arthropods may be involved in mite-disease complex. (3) Test various miticides and insecticides for control of P. graminum.

Ent., Bot., Pl. Path. 291

- Pa. The Genetics and Improvement of Forage Grasses. To (1) determine relative merit for various regions of Pennsylvania of available varieties and strains being developed, (2) investigate factors limiting forage production and utilization of those species which evidence potential merit in forage production program, (3) conduct genetic studies with certain species to implement breeding phase of the work, and (4) develop superior varieties of species which are selected as showing most promise for Pennsylvania conditions.
Agron. 1108 (NE-28) Coop. ARS
- R. I. Control of Diseases of Grasses. To develop more effective fungicides for the control of grass diseases.
Pl. Path., Ent., Agron. 603
- S. C. Diseases of Pasture Grasses. To (1) determine causal organisms involved and reaction of lines or varieties of the more promising pasture grasses to these pathogens; and (2) evaluate methods of control.
Bot., Bact. 64
- S. Dak. The Breeding and Testing of Superior Grasses Adapted to South Dakota. To originate, by breeding and selection, strains of grasses adapted to South Dakota conditions. To introduce and determine the adaptability of strains and species of grasses for the different agricultural areas of the state. To determine the palatability and nutritive value of superior strains. To cooperate with institutions in neighboring states by exchanging ideas and materials. To pursue studies calculated to increase fundamental knowledge relating to the breeding of grasses.
Agron. 182
- Va. Orchard Grass Improvement. To (1) develop adapted, disease-resistant varieties of orchard grass for Southeastern States that can be used for hay, silage and/or grazing; (2) determine inheritance of resistance to certain diseases and of certain agronomic characteristics to provide better basis for combining specific characteristics into a variety; (3) measure performance of specific morphological phenotypes under various ecological and physiological conditions in order to determine plant growth types best suited for various management practices and specific legume-grass combinations; and (4) test performance of new breeding material developed from this and other projects under different Southeastern environments.
Agron. 93907 (S-12)

W. Va.

Diseases of Forage Grasses. To determine (1) what reduction in yield may be caused by the common diseases of major forage crop grasses cultivated in West Virginia, principally, timothy, orchard grass, blue grass, red top, brome grass, and tall fescue; (2) host, range and pathogenic capabilities of various diseases of forage grasses; and (3) whether the amount of loss caused by individual diseases can be reduced by the use of disease resistant selections by alteration of culture and management practices, or by other means.

Pl. Path., Agron. 78, Coop. USDA

Wash.

Investigations on Root Rots and Foot Rots of Cereals and Grasses in Eastern Washington. To (1) learn distribution, prevalence and economic importance of root and foot rots of cereals and grasses in Eastern Washington; (2) learn cause(s) of these diseases; and (3) develop control measures.

Pl. Path. 864

Wash.

Virus Diseases of the Cereals and Grasses. Learn virus diseases of cereals and grasses in state, their distribution, prevalence and severity, cereals affected, forage and weed grasses harboring them, and pertinent factors in spread of disease. Develop resistant varieties or other control.

Pl. Path., Agron. 1280

Wash.

The Influence of Specific Organic Compounds in the Soil Solution (Other than Antibiotics) on the Development of the Root and Crown Rots of Cereals and Grasses. Learn influence of specific organic compounds on development of root and crown rots of cereals and grasses (if they increase or decrease disease level) and if they influence formation of resting spores or other structures of survival formed by pathogens within diseased root and crown tissues.

Pl. Path., Soils, Agron. 1286

Legumes

- Ga. Breeding and Culture for the Improvement in Production and Utilization of Sericea and Crimson Clover. To (1) select and breed strains of sericea with low tannin content; (2) increase and distribute seed of low tannin lines; (3) determine best cultural practices for production and use of sericea and crimson clover; (5) develop more productive strains of crimson clover with emphasis on disease resistance; and (6) conduct variety and strain tests.
Agron., Pl. Path., Forage Chem. 42
- Idaho Determination of Causes of Poor Growth of Legumes in Northern Idaho. To (1) find reason for poor growth of legumes in crop rotations used in northern Idaho; and (2) attempt to increase growth of legumes by use of soil treatments, use of different strains of inoculation, or by combinations of the two methods.
Bact., Agr. Chem., Agron. 245
- Idaho Status of Small-Seeded Legume Viruses in Northern Idaho. (1) Learn the number of viruses or combination of viruses, and what viruses are involved, which contribute to loss of stands of legumes in pastures in Idaho. (2) Ascertain source of inoculation by field surveys and collections. (3) Select for resistance in clovers to infection by viruses studied.
Pl. Path. 322
- Ill. A Study of Root Diseases of Legumes. (1) Identify organisms causing root diseases of legumes. (2) Study morphology and taxonomic relationship of new or poorly understood species. Learn: (3) pathogenicity, etiology, host range, and host-parasite relations of fungi isolated from diseased roots; (4) effect of environment on pathogenic species and on disease development. (5) Search for possible sources of resistance.
Pl. Path., Agron. 68-376
- Ky. Virus Diseases of Forage Legumes. To determine (1) prevalence, distribution, and identification of virus diseases of forage legumes; (2) host range and relation of these viruses to diseases of other economic crops, such as tobacco and vegetables; (3) properties of these viruses and methods to identify and classify them; (4) influence of these viruses on growth, longevity, and economic value of their hosts; and (5) devise methods of control, including search for resistant breeding stocks.
Agron. 158

Minn.

Blackstem and Associated Diseases of Alfalfa and Other Legumes. To (1) identify various causal agents of the blackstem complex on alfalfa, red clover and other forage crops, and to learn their taxonomic relationships; (2) learn the relative economic importance of the organisms associated with blackstem on the different legume crops; (3) become thoroughly familiar with all aspects of the epidemiology of the different organisms on the crops involved, including overwintering, dissemination, and environmental factors that influence infection; (4) search for sources of resistance to blackstem; (5) improve techniques of screening plants and progenies for their reaction to blackstem, and to learn methods of insuring adequate artificial epidemics of blackstem in order to select resistant plants; (6) learn nature of resistance to blackstem, and to learn the mode of inheritance involved; and (7) develop in cooperation with existing state projects means of control of the blackstem complex by breeding resistant varieties, use of chemicals, cultural practices, and other methods.

Pl. Path., Bot., Agron., Genet. 2225 (NC-37) Coop. ARS

N. J.

Studies on Diseases of Forage Legumes. Learn (1) reason for rapid decline in stand and yield of alfalfa from year to year, dying out of ladino plantings, poor recovery of red clover after first cutting, and means of maintaining production longer, (2) incidence of crown rot, caused by Sclerotinia, as factor in decline of legumes.

Pl. Path., Forage 477

N. Y.
(Cornell)

Diseases of Forage Crops.--5. Influences of Plant Disease Upon Legume Maintenance in Meadows and Pastures. To determine severity of diseases.

Pl. Path., Hort. 135-5

Ohio

Control of Forage Crop Diseases with Fungicides. To develop control measures for forage crop diseases through (1) spray application of fungicides, (2) soil and seed application of fungicides.

Bot. 75-2

Okla.

Breeding to Improve Native and Exotic Pasture Legumes. To (1) assemble varieties and strains of native and exotic legumes in observation nurseries for preliminary screening on basis of adaptation and performance; and (2) produce new and superior varieties, using best available material for better adaptation, seed and forage yields, quality or disease resistance.

Agron. 767 (S-12) Coop. ARS

Oreg.

The Detection and Identification of Plant Pathogens Associated with Forage Legume Seed. (1) Detect, identify, and learn pathogenicity of organisms associated with forage legume seed. (2) Develop methods for detection of plant pathogens associated with forage legume seed applicable to improved seed testing procedures.

Bot., Pl. Path., Farm Crops 178 (WM-35)

Oreg.

Forage Legume Diseases. (1) Survey diseases of Oregon forage legumes and learn their distribution and severity in terms of economic loss. (2) Study the etiology of the major diseases of forage legumes. (3) Develop or adapt practical methods for controlling diseases of forage legumes. (4) Identify and clarify taxonomy of pathogenic fungi associated with forage legumes.

Bot., Pl. Path. 335

S. Dak.

Investigations and Control of Alfalfa and Other Forage Legume Diseases. To (1) identify and assess prevalence and economic importance of various diseases of alfalfa and other forage legumes; (2) study biology of pathogens causing diseases with a view to understanding prevalence, survival, and control in the field, and manipulations for extensive plant inoculations in greenhouse; (3) discover cultural and other practices to reduce destructiveness of diseases in the field; (4) evaluate disease resistant qualities of various clones and strains of alfalfa and other forage legumes currently developed or studied; and (5) study nature of disease resistance in certain alfalfa clones to some of the pathogens.

Pl. Path. 230

Tex.

Evaluation and Improvement of Legumes. To (1) collect native and introduced legumes and learn their adaptation to the various climatic and soil conditions of the state; (2) select plants or strains possessing combinations of desired characteristics such as forage and seed yield, forage quality, palatability, stand longevity, resistance to diseases, insects and drouth, ability to grow successfully with other species, winter hardiness, seasonal growth, and vigor of recovery after defoliation; (3) study response of legumes to different fertility levels; (4) combine by breeding methods into a single plant or strain as many superior traits as possible; (5) study factors that may aid in increasing seed production; and (6) conduct extensive strain tests with improved material and increase foundation seed in accordance with objective No. 2.

Agron., Substations 460, Coop. ARS

Wis.

Blackstem and Associated Diseases of Forage Legumes.

- (1) Obtain more information concerning pathogens involved.
- (2) Learn more about the nature of resistance to these diseases and its mode of inheritance.
- (3) Develop technics for the creation of artificial epidemics needed for evaluation of resistance.
- (4) Develop needed breeding technics.
- (5) Try to locate resistance to blackstem diseases and to use resistant materials in a breeding program or make them available for use.
- (6) Explore other methods of blackstem control.

Pl. Path. 1020 (NC-37) Coop. ARS

Alfalfa

Alaska

Breeding Alfalfa Varieties Resistant to the Blackstem Complex. To develop strains of alfalfa resistant to blackstem caused by several organisms in that complex, and to investigate genetic nature of resistance to blackstem, using diploid Medicago falcata. 200-300 selections of diploid M. falcata will be screened for resistance to this disease in greenhouse in 1955. S₁ progenies of about 100 of these are available for testing in the seedling stage. Matings of resistant and susceptible clones will be made to study inheritance of resistance. From these results, hypotheses will be formulated which apply to tetraploid lines and they will be tested by the use of tetraploidized resistant and susceptible clones.

Agron. 44(R) (NC-37) Coop. ARS

Ariz.

Diseases of Roots and Root-Crowns of Alfalfas in Arizona Induced by Soil-Inhabiting Pathogens. (1) Survey alfalfa growing areas to learn more about fungi and bacteria present and to learn etiological significance of noted organisms. (2) Study pathogenicity of various isolated organisms. (3) Learn control of root- and crown-attacking fungi through changes in cultural practices and use of soil fumigants. (4) Study microorganisms in root rhizospheres of alfalfa varieties. (5) Investigate possible control measures.

Pl. Path., Agron. 227

Calif.

Breeding Alfalfa Adapted to Desert Valley Areas of Southwestern United States with Special Emphasis on Resistance to Spotted Alfalfa Aphid (*Therioaphis maculata*).

Develop a variety of alfalfa of superior yield and adaptation to desert valleys of southwest by (1) breeding for resistance to yellow clover aphid, (2) continuing and expanding work on tolerance to *Rhizoctonia* crown and root rot, (3) breeding for increased winter growth habit, (4) breeding for tolerance to alkali and high water table conditions, (5) breeding for lodging resistance.

Forage Crops, Ent., Pl. Path. 1646, Coop. ARS

Colo.

Winterhardiness and Disease Resistance in Alfalfa. To increase (1) bacterial wilt resistance of Meeker Baltic alfalfa while maintaining or increasing the present level of resistance to other diseases and the forage productivity; and (2) seed setting ability of Hardistan alfalfa while maintaining or increasing present level of forage productivity and wilt resistance.

Agron. 7

Colo.

An Investigation and Study of Alfalfa Diseases. (1) Learn organisms responsible for: seed and seedling blight, root rots and vascular wilts of mature alfalfa, stem and foliage diseases. (2) Test and evaluate: seed-treatment materials, soil-treatment materials, spray and dust materials, and varieties for resistance and susceptibility.

Bot. 178

Ind.

Alfalfa Improvement Through Selection and Breeding. To develop by breeding and selection high yielding, disease and insect resistant varieties of alfalfa of high nutritional quality well adapted to environmental conditions of Indiana.

For., Pl. Path., Ent. 245, Coop. USDA

Iowa

Summer Blackstem of Alfalfa and Red Clover Caused by *Cercospora* Species. To (1) determine relative importance of *Cercospora* species in blackstem disease complex; (2) study life cycles, physiology and pathogenicity of the organisms and determine effect of environmental factors on disease development; (3) develop methods of producing epiphytotics in greenhouse and field nurseries; and (4) evaluate for resistance, or tolerance, breeding material and strains of alfalfa and red clover developed by Iowa and other experiment stations in North Central Region.

Bot., Pl. Path., Agron. 1265 (NC-37) Coop. ARS

- Kans. Developing and Testing Pasture-Type Alfalfas. (1) Evaluate various alfalfas, including foreign introductions, as to their ability to persist and survive under the extreme climatic and management practices that prevail on the range. (2) Develop, from the best strains, through selection and breeding, adapted high yielding, disease- and insect-resistant varieties. (3) Study the behavior of pasture-type alfalfas under different management practices and soil and climatic conditions. (4) Conduct uniform variety yield trials involving pasture types.
Agron. 473, Coop. USDA
- Mo. Testing of Alfalfa Strains. To improve alfalfa in yield, quality, and resistance to disease, through selective testing of varietal strains.
Field Crops 241
- Nev. Alfalfa Production, Breeding, Disease, and Quality Investigations. To (1) search for and perpetuate for use in breeding program alfalfa plants that are resistant to parasitic organisms which damage alfalfa; (2) develop, by breeding, a variety of alfalfa that will be resistant to disease organisms which attack alfalfa; (3) determine adaptation of newly developed varieties to different environmental conditions; and (4) determine influence of management on productivity and length of life of stands of newly developed alfalfa varieties.
Agron. 75, Coop. ARS
- N. Y.
(Cornell) Diseases of Forage Crops.--1. Bacterial Wilt of Alfalfa.
To determine severity of said disease.
Pl. Path., Agron. 135-1
- Okla. Breeding to Improve Alfalfa for Pasture and Hay. To develop types of alfalfa suitable for pasture under Oklahoma conditions; and (2) improve production and quality of Oklahoma hay-type alfalfas.
Agron., Bot., Pl. Path. 832, Coop. ARS
- Pa. Movement of Corynebacterium Insidiosum Within the Alfalfa Plant. To (1) determine processes by which bacterial wilt organism moves from point of superficial inoculation to vascular system of an alfalfa plant; (2) study mode of penetration and tissue groups of vascular system invaded by bacterium; (3) study manner of lateral spread of pathogen through vascular system; (4) determine nature of gummous exudate produced by infected plants; and (5) study pathological cytology of disease tissue.
Bot., Pl. Path. 1240-B

- Pa. An Investigation of Alfalfa Crown Rot and a Snow-Mold Condition in Orchard Grass. (1) To determine the cause of alfalfa crown rot and snow-mold condition in orchard grass, (2) study factors influencing development of disease, (3) establish a control.
Bot., Pl. Path., Agron. 1240-C
- Pa. The Genetics and Improvement of Alfalfa (*Medicago Sativa* L.). To (1) determine best existing strains or varieties of alfalfa for Pa.; (2) determine methods of testing to give most reliable and consistent data for strain evaluation; (3) investigate environmental factors, diseases, and insects affecting persistence and forage yield; (4) conduct genetic studies with alfalfa and related species that may clarify origin of *Medicago sativa* and implement alfalfa breeding; and (5) develop superior varieties for Pennsylvania.
Agron. 1190, Coop. ARS
- S. Dak. The Genetics of Reaction of Alfalfa to Diseases of the Blackstem Complex. To (1) learn genetic nature of reaction to foliar diseases represented by the blackstem complex, using diploid alfalfa, and (2) originate and use methods of breeding so disease resistance may be incorporated into improved alfalfa strains.
Agron. 302 (NC-37)
- Va. Evaluation of Radiation Induced Mutations for Use in an Alfalfa Breeding Program. (1) Evaluate mutants produced by radiation in view of use in an alfalfa breeding program. (2) Learn radiation dosage and methods required to obtain mutations. (3) Learn frequency and types of mutations produced by radiation.
Agron. 86083
- W. Va. Maintaining Profitable Stands of Alfalfa. To (1) evaluate soil conditions and disease and insect damage on established fields of alfalfa and relation to yield and longevity of stand; (2) learn effect of placement and amount of nutrient elements on establishment, yield, and longevity of alfalfa stands; and (3) learn effect of soil fungicides and insecticides on establishment, yields, and longevity of alfalfa stands.
Agron., Pl. Path. 50

- Wis. Alfalfa Breeding. To develop (1) resistance to common leafspot (*Pseudopeziza medicaginis*); (2) persistence of stand under frequent cutting and grazing; (3) seedling vigor and capacity to withstand annual weed and nurse-crop competition; (4) seed producing capacity, resistance to leafhoppers, bacterial wilt, "crown deterioration," blackstem, downy mildew, and yellow leaf blotch.
Agron., Pl. Path., Ent. 321, Coop. ARS

Clovers

- Ala. White Clover Improvement. To (1) develop by plant breeding, varieties of white clover which are superior to existing varieties; (2) determine importance of and heritability of plant characteristics which contribute to agronomic value of white clover; and (3) develop techniques to identify plants carrying desirable germ plasm.
Agron., Soils 547
- Ill. Blackstem of Red Clover and Other Forage Legumes. To make (1) comparative study of host-parasite relations of blackstem disease of red clover and alfalfa, and (2) comparative study of pathogenicity, physiology, and morphology of the two blackstem fungi.
Pl. Path. 68-396 (NC-37)
- Ind. Red Clover Improvement Through Selection and Breeding for Desirable Agronomic Characteristics and the Control of Diseases and Insects. To develop by breeding and selection high yielding varieties of red clover well adapted to environmental conditions of this area and having resistance to diseases and insects.
Bot., Pl. Path., Agron., Ent. 769 (NC-11) Coop. ARS
- Iowa Sweetclover Improvement. To (1) develop improved strains of diploid and tetraploid sweetclover through recombination of inbred lines and/or selected plants maintained by clonal propagation, (2) determine systems of breeding to utilize most efficiently the inbred lines and selected plants in developing superior strains, (3) investigate possibilities for utilizing interspecific hybridization in *Melilotus* as a means to transfer desirable genes to economic species, (4) determine systems of self-incompatibility as related to problems of inbreeding, and (5) evaluate autotetraploid sweetclover from agronomic value and cytological and morphological characteristics.
Farm Crops, Bot., Pl. Path. 1150

- Md. Red Clover Improvement. To (1) further increase resistance of promising strains to Colletotrichum trifolii and improve forage quality and yield; (2) investigate more thoroughly reasons for stand elimination of red clover in Maryland; and (3) broaden breeding program to develop better red clover strains for Maryland in light of findings under Objective 2.
Agron. B-56-a, Coop. ARS
- Pa. Diseases of Red Clover. (1) Learn relative importance of root, crown, and foliar diseases of red clover in State. (2) Study factors influencing development of diseases of red clover. (3) Develop standard techniques for evaluation of resistance to these diseases.
Bot., Pl. Path. 1240-D
- S. C. Diseases of Perennial White Clovers and Methods for Their Control. To learn organisms causing diseases of white clovers; to study pathogenicity, life history, physiologic forms of organisms, methods of inoculation, host-parasite relationships; to cooperate with plant breeders in development of resistant varieties, and develop cultural practices and seed treatments for disease control.
Bot. 95
- W. Va. Selection and Breeding of Superior Strains of Red Clover for West Virginia. To study (1) comparison of locally grown red clover with improved strains in various red clover producing regions; (2) securing of improved strains by breeding and selection; and (3) propagation and production of improved disease resistant high yielding strains.
Agron., Pl. Path. 34, Coop. FES
- W. Va. The Cause of and Remedy for Red Clover Failures in West Virginia. To (1) determine cause of failures of red clover hay and seed crops and devise remedies, and (2) investigate factors found primarily responsible for these crop failures.
Pl. Path., Agron. 51, Coop. USDA

Lespedeza

N. C.

The Development of High Yielding Varieties of Annual and Perennial Lespedeza with Improved Quality of Forage, and Resistance to Diseases and Insect Pests. To (1) isolate superior genotypes and recombine desirable traits insofar as possible into single varieties, (2) evaluate and characterize varieties and experimental strains, and (3) conduct studies on genetics and cytogenetics of lespedeza basic to development of sound and efficient breeding procedures.

Agron. 52 (S-12) Coop. ARS

Minor Legumes

Fla.

Improvement of Lupines by Breeding for Yield and Insect and Disease Resistance. To develop improved varieties of lupines adapted to Florida conditions.

Pl. Path., Agron. 612

Fla.

Virus Diseases of Lupines. Learn virus diseases of lupines with respect to identification, insect vectors, distribution, and field sources.

Pl. Path. 742

Mo.

Breeding to Develop Superior Varieties of Birdsfoot Trefoil and Annual Lespedeza. To develop (1) varieties of broadleafed birdsfoot trefoil superior to present commercial varieties in seed producing habits, persistence of stands, seedling vigor, and other agronomic qualities; and (2) more aggressive and productive varieties of annual lespedeza resistant to bacterial wilt.

Field Crops 221, Coop. USDA

REGIONAL PROJECTS

- NC-37 Improvement of Alfalfa and Other Forages Through Basic Studies in Genetics and Pathology. To (1) obtain information on etiology, host-parasite relations, epidemiology and control of blackstem and related diseases. (2) Determine the nature of resistance and the mode of inheritance involved. (3) Devise breeding methods to attain disease resistance. (4) Incorporate disease resistance into improved varieties for use in the North Central region.

Contributing Projects: Alaska V-D, Ill. V-E,
Iowa V-D, Minn. V-C, S. Dak. V-D, Wis. V-C.

OTHER REGIONAL RESEARCH PROJECTS IN RELATED FIELDS MAY
BE FOUND IN OTHER PARTS OF THE COMPILATION AS FOLLOWS:

- NC-7 New Plants - The Introduction, Multiplication, Preservation and Evaluation of New Plants for Industrial and Agricultural Use. See ARS-23-8-12.
- NC-11 The Development of Improved Techniques of Forage Crop Evaluation. See ARS-23-8-10.
- NC-23 Requirements and Design of Structures and Related Equipment for Unified Farmstead Operations. See ARS-23-8-3-b.
- NE-23 Breeding of Small Grains for Resistance to the Hazards of Production in the Northeastern States. See ARS-23-8-8-a.
- NE-28 Breeding and Evaluation of Improved Varieties of Forage Crops Adapted to the Northeast. See ARS-23-8-10.
- S-1 Genetics and Cytology of Cotton. See ARS-23-8-8-b.
- S-12 Production and Evaluation of Forage Crops and Pastures in The South. See ARS-23-8-10.
- W-38 Nature and the Influence of Crop Residues on Fungus Induced Root Diseases. See ARS-23-8-17-a.
- WM-35 Facilitating the Marketing of Seed Through Improved Testing Procedures. See ARS-23-8-10.

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS
AT STATE AGRICULTURAL EXPERIMENT STATIONS

| ARS-23-8: | | |
|-----------|------------------------------------|--|
| Part : | Subject-Matter Area | Title of Section |
| Numbers : | | |
| 1 | Agricultural Chemistry | Agricultural Chemistry |
| 2 | Agricultural Economics | a. Prices, Incomes, & General Studies of Com- modities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation |
| 3 | Agricultural Engineering | a. Land & Water Use & Develop- ment b. Power Machinery & Equipment c. Farm Structures & Materials |
| 4 | Animal Husbandry | a. Beef Cattle b. Sheep & Goats c. Swine |
| 5 | Dairy Husbandry | Dairy Cattle |
| 6 | Dairy Technology | Dairy Technology |
| 7 | Entomology & Economic Zoology | a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides |
| 8 | Field Crops | a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops |
| 9 | Food Science & Technology | a. Food Chemistry, Micro- biology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Develop- ment, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing |
| 10 | Forage Crops, Pastures & Ranges | Forage Crops, Pastures & Ranges |
| 11 | Forestry | Forestry |

ARS-23-8:

| Part : | Subject-Matter Area | Title of Section |
|-----------|---------------------|------------------|
| Numbers : | | |

| | | |
|----|--------------------------------|--|
| 12 | Fruits & Nuts | Fruits & Nuts |
| 13 | Home Economics | <ul style="list-style-type: none"> a. Human Nutrition b. Housing c. Clothing & Textiles d. Foods-Consumer Quality & Utilization e. Household Economics & Management |
| 14 | Economics of Marketing | <ul style="list-style-type: none"> a. Field Crops b. Fruits & Vegetables c. Livestock, Meats & Wool d. Dairy Products e. Poultry & Poultry Products f. Forest Products & Ornamental & Drug Plants g. Cross-Commodity & Functional Studies |
| 15 | Meteorology | Meteorology |
| 16 | Ornamental & Drug Plants | Ornamental & Drug Plants |
| 17 | Plant Pathology & Bacteriology | <ul style="list-style-type: none"> a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops b. Diseases of Field Crops c. Diseases of Fruit Crops d. Diseases of Vegetable Crops |
| 18 | Plant Physiology & Nutrition | Plant Physiology & Nutrition |
| 19 | Poultry Industry | Poultry Industry |
| 20 | Rural Sociology | Rural Life Studies |
| 21 | Soils | <ul style="list-style-type: none"> a. Soil Chemistry & Microbiology b. Soil Fertility, Management & Soil-Plant Relationships c. Soil Physical Properties, Conservation & Classification |
| 22 | Vegetables | <ul style="list-style-type: none"> a. Vegetable Crops b. Potatoes |
| 23 | Veterinary Science | Veterinary Science |
| 24 | Weeds | Weed Control |

